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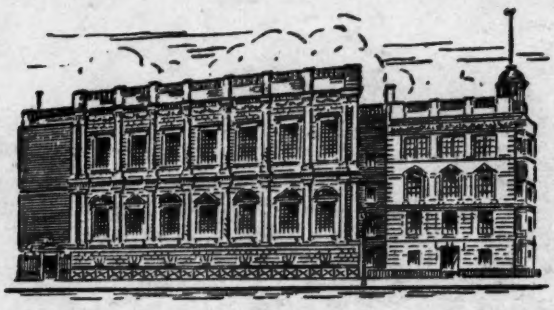

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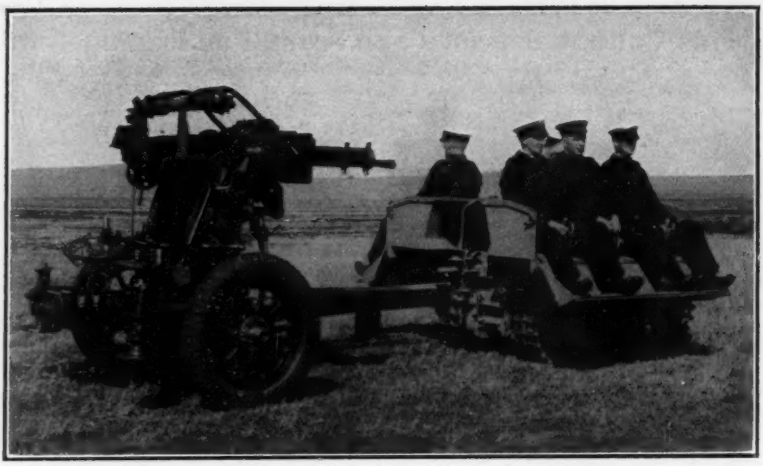

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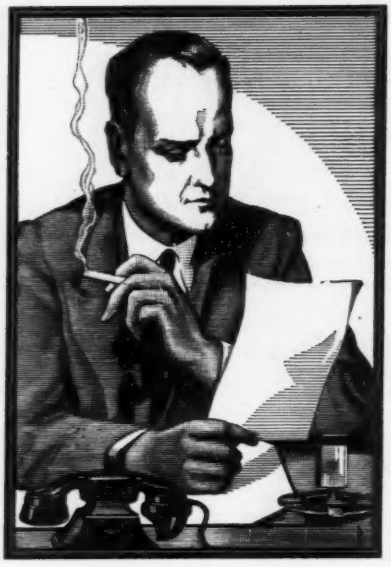

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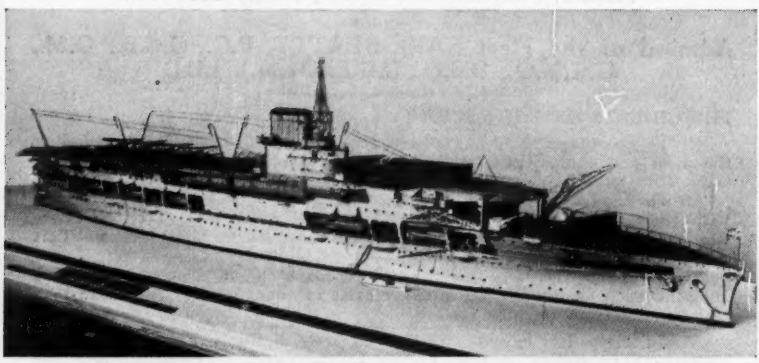

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SECRETARY'S NOTES

February, 1935.

Visit of H.R.H. The Duke of York

H.R.H. the Duke of York visited the Institution on the 19th December to preside at a General Council Meeting of King George's Fund for Sailors, which was held in the theatre. He was received by Admiral of the Fleet the Earl Jellicoe, O.M., G.C.B., G.C.V.O., LL.D., representing the Council. Subsequently he was shown round the Museum by Captain E. Altham, C.B., R.N., Secretary and Chief Executive Officer.

Anniversary Meeting

The Anniversary Meeting will be held on Tuesday, 5th March, at 3.30 p.m. The Council will present their Annual Report and Accounts, and there will be an election to fill the vacancies on the Council. The Gold Medal will be presented to the winner of the 1934 Essay Competition.

Copies of the Annual Report and Accounts can be obtained in advance on application to the Secretary.

Council

The following Members of the Council, having completed three years' service, retire, but offer themselves for re-election :—

ROYAL NAVY
Rear-Admiral B. W. M. Fairbairn, C.B.E.

ROYAL MARINES
Brigadier W. W. Godfrey, C.B., C.M.G., A.D.C.

ROYAL NAVAL VOLUNTEER RESERVE
Commodore the Earl Howe, C.B.E., V.D.

REGULAR ARMY
Colonel G. E. C. Rasch, D.S.O.
General Sir Robert Whigham, G.C.B., K.C.M.G., D.S.O.

TERRITORIAL ARMY
Colonel F. D. Samuel, D.S.O., T.D.
Colonel B. Abel Smith, D.S.O., M.C., T.D., A.D.C.

Representative Member

Air Commodore A. S. Barratt, C.M.G., M.C., *p.s.a.*, has succeeded Air Vice-Marshal Sir Edgar R. Ludlow-Hewitt, K.C.B., C.M.G., M.C., as Air Ministry Representative on the Council.

Ex-Officio Member

Major-General R. H. Haining, D.S.O., *p.s.c.*, has succeeded Admiral Sir L. G. Preston, K.C.B., as an ex-officio Member of the Council, on taking up the appointment of Commandant of the Imperial Defence College.

Staff

The Council have appointed Paymaster Lieutenant-Commander J. Hogg, R.N., as Assistant Librarian and Fourth Officer of the Institution.

New Members

The following officers joined the Institution during November, December, and January :—

ROYAL NAVY

Acting Sub-Lieutenant D. E. Bromley-Martin, R.N.
Lieutenant E. Mack, R.N.
Commander T. C. T. Wynne, R.N.
Admiral E. R. le Marchant, D.S.O.
Paymaster Lieutenant-Commander J. Hogg, R.N.
Lieutenant-Commander U. C. de Burgh, R.N.
Sub-Lieutenant A. D. P. Campbell, R.N.
Midshipman W. A. Phillimore, R.N.
Lieutenant V. N. Graves, R.N.
Sub-Lieutenant R. F. Colvile, R.N.
Rear-Admiral St. A. B. Wake.
Lieutenant-Commander H. T. Pitt, R.N.
Paymaster Sub-Lieutenant H. S. A. Gerson, R.N.V.R.

ROYAL MARINES

Captain F. B. Pym, R.M.
Major R. A. R. Neville, R.M.

ARMY

Captain C. S. Napier, R.E.
Lieut.-Colonel C. E. Pierson, D.S.O., late R.A.
Lieutenant A. H. Dangerfield, Royal Warwickshire Regiment.
Captain R. A. d'E. Ashe, 11th Sikh Regiment.
Colonel R. M. Birkett, D.S.O.
Lieut.-Colonel A. G. Cunningham, D.S.O., M.C.
Lieutenant K. C. C. Smith, 12th Royal Lancers.
Captain C. F. Keightley, 5th Inniskilling Dragoon Guards.
Lieutenant D. N. V. Buckle, R.A.S.C.
Lieutenant-Colonel R. M. Crosse, late R.A.
Captain R. F. S. Stoney, R.E.
Lieutenant H. C. Boyce, R.A.
Lieutenant C. J. N. Rugge-Price, R.A.
Captain S. E. E. Morres, R.C.A.
Colonel W. P. J. Akerman, D.S.O., M.C., R.A.
Lieutenant C. Goulburn, 8th Hussars.

Major J. S. Knyvett, Royal Warwickshire Regiment.
Lieut.-General R. J. T. Hildyard, C.B., C.M.G., D.S.O.
Captain P. O. B. Sherwood, Bedfordshire and Hertfordshire Regiment.
Major-General J. H. F. Lakin, C.B., C.S.I., I.A.
Lieutenant H. M. Brodhurst, South Staffordshire Regiment.
Captain R. R. Proud, Gurkha Rifles.
2nd Lieutenant R. R. Griffith, The Devonshire Regiment.
2nd Lieutenant R. G. Lewthwaite, Scots Guards.
2nd Lieutenant G. W. Hawkes Field, The Leicestershire Regiment.
Major J. N. Tetley, 7th Bn. West Yorkshire Regiment (T.A.).
Lieut.-Colonel C. W. Fladgate, Royal Signals.
Major R. E. Hobday, D.S.O., Royal Scots Fusiliers.
Lieutenant C. H. Hodder, The Leicestershire Regiment.
2nd Lieutenant G. B. C. Roberts, Durham Light Infantry.
Lieutenant R. G. R. Chilton, The Dorsetshire Regiment.
2nd Lieutenant A. A. D. Martineau, Royal Sussex Regiment (T.A.).
2nd Lieutenant C. H. Pinsent, U.L.I.A.
Lieutenant R. H. L. Wheeler, R.A.
Major A. D. Lowdell, R.A.S.C.
2nd Lieutenant K. Slater, The Queen's Royal Regiment.
Major E. C. Pinder, R.A.S.C.
2nd Lieutenant D. A. Findlay, R.A.S.C.
Lieut.-Colonel J. Dixon, V.D., Canadian Field Artillery V.R.

ROYAL AIR FORCE

Flight Lieutenant R. Kellett, R.A.F.
Squadron Leader J. Blackford, R.A.F.
Flying Officer H. R. L. Hood, R.A.F.
Flying Officer A. R. Leslie-Melville, late R.A.F.
Flying Officer D. I. Coote, R.A.F.

Gold Medal Essay Competition (Naval) 1934

The following essays have been received :—

" Ut venient omnes."
" Make Certain."
" The strength of the ship is the Service."
" Persevere."
" Majestically the battle squadron rolled."
" By thousands manned."
" Præmonitus, præmunitus."
" Sauce for the Goose."
" Semper paratus."
" Pie, Naam, Tung and Si."

Results of the Competition

The following is the result of the competition for the Gold Medal of the Royal United Service Institution and the Trench Gascoigne Prize :—

Gold Medal and First Trench Gascoigne Prize :—Lieutenant G. M. Bennett, R.N.

Second Trench Gascoigne Prize :—Lieutenant-Commander P. H. S. Reid, R.N.

Third Prize (bracketed) :—Commander Carlyon Bellairs, R.N.
Lieutenant-Commander P. W. Brock, R.N.
Honourably mentioned :—Lieutenant-Commander E. W. Monckton, R.N.
Lieutenant N. McI. Kemp, R.N.
Commander H. Hickling, R.N.

Gold Medal Essay Subject (Air) 1935

The following subject has been selected :—

"Discuss the effect of the development of air power on British interests in the Mediterranean, and suggest how these interests should be protected."

For particulars of the Competition apply to the Secretary.

Office to Let

A small office on the top floor of the Institution can be let to an approved tenant. Application should be made to the Secretary.

Change of Address

Members are reminded that they are responsible for keeping the Secretary informed of any change of address. Non-receipt of the JOURNAL is almost invariably attributable to the fact that the member has not notified his movements.

Additional Lecture

A lecture on "The Territorial Army" will be given on Wednesday, 20th March, 1935, at 5.30 p.m., by Lieutenant-Colonel J. K. Dunlop, M.C. Lieutenant-General Sir C. Bonham-Carter, K.C.B., C.M.G., D.S.O., will take the chair.

EARDLEY-WILMOT MEDAL COMPETITION

The first competition for the Gold Medal instituted by the late Rear-Admiral Sir Sydney M. Eardley-Wilmot is now open.

The Medal will be awarded for the best essay contributed by a Member of the Institution on :—

"Changes in Naval Warfare owing to New and Modified Weapons."

Essays must be typed in triplicate, and each copy must be clearly marked "Eardley-Wilmot Competition" on the outside. Care should be taken to avoid confidential matter. When a reference is made to any work, the title of such work must be quoted.

Essays must be strictly anonymous, and each must have a Motto, which must be written on the outside of each copy. They must be accompanied by a sealed envelope with the Motto written on the outside, and the competitor's name inside.

All essays must be sent by registered post, addressed to the Secretary, Royal United Service Institution, Whitehall, London, S.W.1, and must reach the Institution not later than the 15th November, 1935.

Any essay written by a serving officer will be submitted for official sanction before it is published.

All essays submitted for this competition will become the absolute property of the Council.

LENDING LIBRARY

New Catalogue

The Library has now been completely re-catalogued and the lending system revised. The Council hope that this will materially increase its value to members, especially those officers who may require books to study for the Staff College or Promotion Examinations. Expense prohibits copies of the new catalogue being printed, but the Library contains practically every professional work of importance, and the latest additions will be found at the end of each quarter's JOURNAL.

Rules Governing Return of Books

The attention of Members is invited to the following Regulations governing the retention and return of books :—

(1) Certain books, for which there is a special demand, must not be retained longer than a fortnight after the date of receipt. A notice to this effect will be found in the book.

(2) In the United Kingdom.—Books must normally be returned within one month of the date of issue; but the Librarian is authorized to make extensions of one month at a time on application by a Member, up to a maximum of three months from the date of issue, if the work is not required by another Member.

(3) Stations Abroad.—When books are sent to Members abroad the same rules apply as for the United Kingdom, except that " the date of receipt " is substituted for " the date of issue."

N.B.—IN VIEW OF THE INCREASING DEMAND FOR BOOKS FROM THE LENDING LIBRARY, IT IS ESSENTIAL IN THEIR OWN INTERESTS THAT MEMBERS SHOULD ADHERE STRICTLY TO THE RULES GOVERNING THE RETURN OF BOOKS. FAILURE TO DO SO IS CAUSING MUCH INCONVENIENCE, AND INVOLVING THE INSTITUTION IN UNNECESSARY EXPENSE AND CLERICAL LABOUR.

MUSEUM

Military Exhibition

A new Special Exhibition is being prepared, and will be open before the Easter holidays. This will take the form of a 40-ft. diorama showing " The Mechanized Army of To-day in Miniature," including representative units of both the forward area and H.Q. formations. The models and " personnel " are being lent from his collection by Mr. A. Leicester Hewitt.

Additions

(8750) General Gordon's Khartoum Star in pewter, and a 25-piastre note with his autograph and seal.—Presented by E. S. Lamplough.

(8751) Model of a Fairey " Seal " Fleet Air Arm day bomber.—Presented by the Fairey Aviation Co.

(8752) Model of a Yarrow shallow draft river steamer, as used in the Nile expeditions of 1897 and 1898.—Presented by Lady M. Graham.

(8753) Collection of Indian Medals and Orders.—Presented by the Secretary of State for India.

(8754) Seal made from metal recovered from H.M.S. " Royal George."—Presented by Colonel M. D. Bell.

(8755) Engraving of the picture by de Neuville of Rorke's Drift.—Presented by Lieutenant A. E. Sutcliffe, R.N.

(8756) Officer's Tunic, Grenadier Guards, period 1902–1909.—Presented by Captain A. H. Travers.

(8757) Collection of badges and buttons.—Presented by the Rev. G. Hawkes Field.

(8758) Sword, miniature and commission of Captain D. Colby, R.N.—Presented by A. H. Powell.

(8762) Bronze bust of Admiral of the Fleet the Earl Jellicoe, O.M., G.C.B., G.C.V.O., LL.D.—Purchased.

Attendance

The amount taken for admission during the past quarter was :—

£107 15s. od. in November.
£74 os. od. in December.
£127 18s. 6d. in January.

Purchase Fund

This fund has been formed to assist in the purchase of new exhibits. The Council hope it will receive the support of members interested in the Museum.

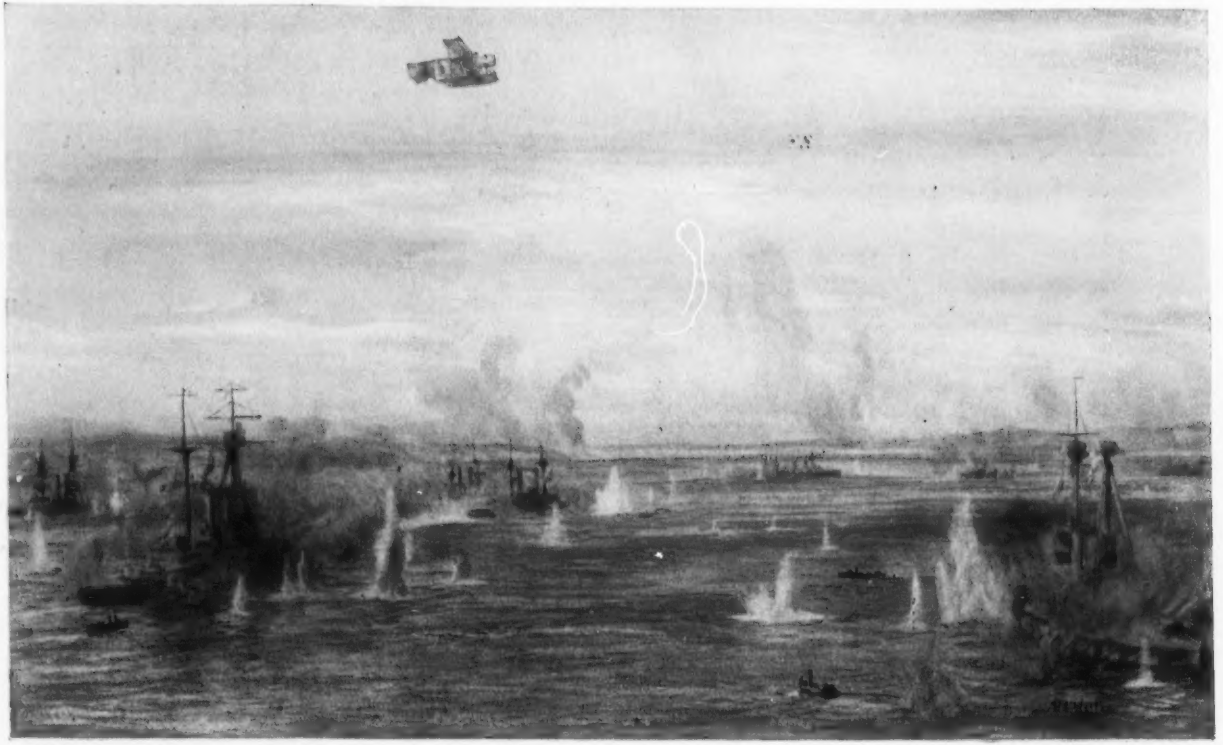
JUBILEE PROCESSION

Owing to the very limited space in the windows of the Banqueting Hall, the Council are endeavouring to arrange for a block of seats in one of the official stands to be allocated to the Institution for Members and their friends to witness the Royal Procession on the occasion of the Silver Jubilee of H.M. the King in May next.

Details of this arrangement cannot be given until H.M. Office of Works have allocated the seats and made known their charge ; but the cost to Members will probably not be less than one guinea a seat.

Applications for seats in the Official Stand, which must be limited to three tickets per Member, should be made to the Secretary before 31st March next. In the event of applications exceeding the number of seats available, tickets will be balloted for.

Places in the windows of the Banqueting Hall have already been filled, having been allotted in order of application (vide Standing Order, Chapter V, para. 2). The charge for tickets for these places will be communicated in due course, when the route and other arrangements have been announced.



By courtesy of Lt.-Colonel Harold Wyllie, O.B.E. *From the original by W. L. Wyllie, R.A.*

TWENTY YEARS AGO

BOMBARDING THE NARROWS 18th MARCH, 1915

Reproduced from "Sea Fights of the Great War." Messrs. Cassell & Co., Ltd.

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[Authors alone are responsible for the contents of their respective Papers. All communications (except those for perusal by the Editor only) should be addressed to the Secretary, Royal United Service Institution.]

THE TREND OF ORGANIZATION IN THE ARMY

By COLONEL G. N. MACREADY, C.M.G., D.S.O., O.B.E., M.C.

On 14th November, 1934.

GENERAL SIR A. A. MONTGOMERY-MASSINGBERD, G.C.B., K.C.M.G., A.D.C., in the Chair.

The Chairman introduced the Lecturer.

LECTURE

MUCH of the detail of Army Organization must inevitably be regarded as secret; but the object of this lecture is to explain in what manner and in the face of what difficulties we are endeavouring to organize the Army for modern warfare, and, if I am to fulfil it, I must endeavour to strike a happy mean between indiscretion and caution. That, I hope, will meet with your approval as well as that of my masters.

For many years now, on the stage–and even, I regret to say, on the wireless–the War Office has been treated as a matter for ribaldry, almost to the same extent as such threadbare subjects as mothers-in-law; whilst within the last few months I seem to remember reading in the Press accusations that we are organizing for the last war but one, and are spending our time preparing human flesh as cannon fodder regardless of experience and modern inventions. If I can do no more than correct such unfortunate and uninformed impressions I shall feel that my efforts have not been in vain.

PROBLEMS AFFECTING ORGANIZATION.

Functions of the Army.—In Great Britain, and, in fact, in the Empire as a whole, we have a military problem very different from that confronting most European Powers. Their problem is usually comparatively simple, namely, that of defending their national territories against potential enemies living on the far side of their frontiers. Britain, however, never has maintained, and never will maintain, an army specifically intended for intervention in continental wars. Our military forces are primarily intended for Imperial defence, for garrisoning the outlying parts of the Empire, for the protection of our trade routes, and for dealing with minor military contingencies that from time to time may arise in distant parts. With these commitments in view, the Regular military forces of the United Kingdom are organized under the Cardwell System, that is on a basis of approximately one-half of them at home and the other half abroad—the latter being relieved and kept up to strength by the former.

At the same time we have to bear in mind that for purposes of self-defence, and perhaps owing to commitments accruing under the Locarno Treaty and under the Covenant of the League of Nations, we may yet again have to intervene on the Continent and face an enemy possessing an army equipped and organized on the most modern lines. Our problem in essence is, therefore, the organization of the best and most modern field force compatible with the limits imposed by the Cardwell System.

Before proceeding further I wish to make it clear that I shall deal almost entirely with the problem of organizing and equipping the field force of the Regular Army for modern war ; but it must not be forgotten that in addition we have to cater for garrisoning and equipping our numerous defended ports at home and abroad, and for the establishment of air defences in this country on an ever increasing scale. These requirements alone must make a very large hole in the military pocket of this country. There is the further question of arranging for an expansion of the field force in the event of a major war. This is a problem of immense magnitude, which I shall do no more than refer to very briefly.

India.—In every step that we may wish to take for the reorganization, modernization or mechanization of the Army, we have to consider a number of basic factors which cannot be ignored. In the first place, we have to bear in mind that any reorganization in that part of the Army stationed at home reacts immediately on India. Suppose, for example, we wish to mechanize horse artillery brigades at home or convert

horsed cavalry regiments to some mechanized basis ; before doing so we have to make certain that our drafting and relief arrangements for the upkeep of the Army in India will not break down. Again, if we wish to reorganize infantry brigades at home on a new basis of three rifle battalions and one support battalion—a subject to which I shall revert later—we have to be certain that we can place an equivalent proportion of support battalions in India or elsewhere abroad : otherwise the Cardwell System will break down. I will not go so far as to say that the Cardwell System can never be subjected to modification, but I think we must assume that until a practical alternative can be evolved this system must be adhered to.

Finance.—Another important factor—in fact, to the man in the street possibly the most important factor—is finance. Since the War, although we have been experimenting continuously on a small scale with mechanization, new equipment, and new armament, it has not yet been possible to apply the knowledge thus gained on any considerable scale to the Army as a whole : firstly, because we wished to perfect our knowledge as much as possible and the international situation appeared to give us time to do so ; secondly, because financial stringency stood in the way of any large-scale reorganization and re-equipment. It must also be remembered that there is a heavy and proportionately increasing cost of maintenance and replacement as the Army is mechanized and modernized.

Generally speaking, the equipment—and to a large extent the organization—of the Regular Army remains much as it was at the end of the Great War ; and as regards material we have been very largely living on our fat. This fat is obviously not only becoming very meagre, but in some cases is now positively rancid, so that we have arrived at a situation in which, whether we like it or not, if we are to place an army in the field again, money has to be spent.

Since 1926 the Army Estimates have varied between £43,000,000 and £39,000,000. After subtracting the sums required for ordinary " housekeeping " and maintenance purposes, as well as for air defence at home and for defended ports, etc., abroad, there has remained a sum never exceeding £1,000,000 for experimenting with modern equipment and for applying it, when approved, to the Army ; indeed, in the current year's Army expenditure only about £650,000 has remained available for purchasing up-to-date equipment and ammunition, etc., for the field army.

The magnitude of the resultant problem will be better appreciated when I state that the cost of equipping one tank brigade of the present

pattern with mobilization equipment and war reserves to keep it in the field until post-mobilization production overtakes war wastage is in the neighbourhood of £4,500,000. The capital cost of equipping an infantry division with mechanized transport and modern armament, together with its war reserves of equipment and ammunition, may probably be assessed at some figure between £6,000,000 and £8,000,000.

War Reserves.—At this juncture I will refer very briefly to this important question of war reserves. We all of us remember vividly the grave shortage of ammunition, which occurred almost immediately on the outbreak of war in 1914, and how it was hardly made good until the end of 1917. This is a situation which must not be permitted to occur again.

In any future European war, not only the expenditure of ammunition but the wastage of material is bound to be considerable. We calculate, for example, that a wastage of some 20 per cent. of armoured fighting vehicles per month is to be anticipated. We also know that, owing to the very small number of firms now manufacturing armaments in this country, the normal output of such vehicles, as well as of all types of arms and of ammunition, is extremely limited, and does not cover more than a fraction of our probable war wastage.

We are, therefore, faced with the dual problem :—

(1) Of building up and holding sufficient reserves to place an army in the field and keep it equipped until war production is capable of meeting war wastage ;

(2) Of organizing industry so as to be able to cope with the war wastage as well as with the equipment of new armies as soon as possible.

These two problems naturally react on one another. Supposing it were possible for industry to turn over almost immediately on outbreak of war to the production of the many complicated types of stores required for warlike purposes, the money to be spent in peace-time on war reserves could be reduced to a minimum. Unfortunately such an ideal can never be attained, and I think we may say that, generally speaking, the adaptation of civil industry to the production of war stores, which it does not normally produce in peace, will take from five to twelve months, according to the type of store, and then only if this transition has been most carefully planned, and if specifications, jigs, gauges, etc., are all available on the outbreak of war.[1]

This question of the production of warlike stores after the outbreak

[1] See also "Some Problems of a Technical Service," in the JOURNAL for November, 1934, p. 780.

of war is an immense subject in itself, and I can do no more than allude to it. I should add, however, that the problem has been under consideration for a good many years by the Committee of Imperial Defence and that, within the limitations of a paper scheme, it is approaching solution. Nevertheless it is to be noted that, in this question of industrial mobilization, we in this country have to rely entirely on the goodwill of industry, and that the latter is under no statutory obligation whatever to assist in our planning. Whether the problem can be solved really efficiently in such circumstances remains to be seen.

MAIN DEVELOPMENTS IN ORGANIZATION.

Now that I have outlined the principal factors which have to be borne in mind when considering any reorganization or re-equipment, I will deal with the actual developments which have been taking place or which are contemplated in the Army.

Broadly speaking, the following are the main developments that have taken place in Army organization since the late war :—

(1) The universal adoption of the internal combustion engine ;

(2) An increase in the support given by other arms to infantry, together with increased fluidity in the organization of such support.

Mechanization for Transport.—It is an indisputable fact that the horse is rapidly dying out in this country so far as civilian transport is concerned, and that the internal combustion engine must consequently now be accepted as the basis of Army military transport. The importance of basing the transport of the Army as far as possible on material normally used and produced in civil life renders such a step imperative ; otherwise the problem of war reserves becomes quite insoluble.

In the days when the horse provided the normal means of transport, this question of war reserves was, of course, a comparatively minor matter, since horses could be impressed or bought as they were required. But nowadays the light draught-horse is disappearing in England, so that if, with our present establishments, we wished to place twelve Regular and Territorial divisions in the field during the first six months of war we should have to import about 6,500 horses a month from the second to the sixth month ; and after the sixth month about 8,000 horses a month. If the length of the voyage, probably from South America, be taken into account, together with the fact that only about 500 horses form one shipload, the magnitude of the problem becomes apparent.

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Having eliminated the horse from the Army for general transport purposes, we are faced with a most serious problem, namely, what types of lorry are required, and, secondly, can we hope to obtain the necessary numbers without incurring very heavy expenditure in peace-time. Broadly speaking, one-third of the lorries required in the field must work in the forward areas, and these must have a reasonably good performance along tracks and even over rough country. Until very recently such a performance could be obtained only by the employment of 6-wheelers, and on present war establishments for a Regular field force we should require over 10,000 lorries and vans, of which over one-third are 6-wheeled 3-ton or 30-cwt. lorries. At the moment the Army possesses in peace-time and requires for training only about 1,600 lorries, of which 600 are 3-ton 6-wheelers. The balance must, therefore, come from existing civil sources ; and since a Regular field force would presumably have to move overseas at very short notice, we cannot rely on post-mobilization production.

Unfortunately, owing to the exceptionally good roads existing in Great Britain, the 6-wheeler lorry of military type has not proved attractive for civil purposes, in spite of quite a generous subsidy scheme. At first sight this appears to be rather a disquieting fact, but it looks as if the situation will be saved by the greatly improved performance of the 4-wheeled 3-ton lorry with low-pressure tyres, which is becoming very popular and is even replacing the small tractor for ploughing in some parts of the country. Recent trials have shown that this lorry has a performance not very far short of the 6-wheeler except in very wet and marshy country, and, as the money required for providing the Army in peace-time with the total number of lorries required in war will never be forthcoming, we shall no doubt have to acquiesce in a slightly reduced performance for many purposes in time of war.

Before leaving the subject of lorries required for general transport purposes, I should like to mention another point. The official life of an Army lorry in peace is on an average about ten years, while the turn-over is very small. But in our impressment schemes we naturally only count on comparatively up-to-date civilian transport. If we are not careful many of the impressed vehicles may be of a type to which transport drivers and workshop personnel in the Army are not accustomed, so we must make sure that the Army is not lagging behind in transport developments. To illustrate my meaning : the compression-ignition or heavy-oil engine is now being introduced in civilian transport, and it may well become very popular owing to decreased running costs. So we shall have to acquire a few of these vehicles to replace the ordinary petrol lorries as the latter become over age.

To sum up, the main points whereby the organization of the Army is affected by the introduction of mechanical transport are as follows :—

(*a*) The horse situation definitely compels an increased employment of mechanical transport ;

(*b*) Unless cut down to a minimum, the employment of such transport will defeat its own end, namely, a widely increased mobility of our military forces, owing to the immense length of road covered by transport columns, supply columns, workshops, etc. ;

(*c*) At least one-third of the mechanical transport required by a field force must work in the forward areas and have a reasonably good cross-country performance ;

(*d*) The transport of mechanical vehicles by sea and rail, especially those of a technical nature, presents a difficult problem owing to their height. Many of them cannot be stowed between the decks of a ship and cannot pass under bridges when loaded on rail.

Tactical Application of Mechanization.—So far I have only mentioned the employment of the internal combustion engine as a substitute for the horse, mainly because the horse is dying out. But there is the further and equally important question of employing this engine in order to obtain tactical advantages on the battlefield by means of armoured transportation or by the rapid movement of troops in unarmoured vehicles—that is, by the use of tanks and armoured cars or by the conveyance of complete units in transport vehicles. This application is, of course, a purely voluntary step taken to achieve a definite purpose unobtainable by other means, and I think it is quite clear that it is a step which all nations must take nowadays so far as their industrial situation permits. Here I would again refer to my previous remarks about limitations imposed on us by the expense involved and by the Cardwell System.

Standardization of Equipment.—Before turning to actual developments in the various branches of the Service, I should like to refer to an important general principle affecting Army organization both as regards mechanization and armament, namely that, as far as possible, ***standardization must be the keynote of our design.*** It is essential to avoid undue multiplicity of design if we are to keep our war reserves within reasonable limits, and the greater the degree to which standardization can be achieved the quicker will be our post-mobilization production. For example, if the chassis of the light tank can be made the same as that of the light dragon which draws our field artillery,

and the chassis of the armoured car can be identical with that of the 3-ton lorry, the speed of post-mobilization production to catch up war wastage will be proportionately increased, and the amount of money we have to spend in peace-time on war reserves will be similarly reduced.

Moreover, in the absence of any reasonable degree of standardization, our organization for modern war is liable to lead to the result that even cavalry regiments and infantry battalions will be almost entirely composed of specialists. If the weapons required for anti-tank, anti-aircraft, light automatic, and machine-gun work all embody entirely different patterns of mechanism, many complexities must arise. Not only will training and drafting difficulties be increased, but the supply of specialist reservists, on which our mobilization to a great extent depends, must present a formidable task. This important question of standardization is, in fact, one of extreme difficulty, particularly so far as armament is concerned. I think I may claim, however, that the problem is being tackled really seriously and that, in the matter of mechanical transport, a considerable measure of success is being achieved.

THE MOBILE TROOPS AND DIVISIONS.

Turning now to actual developments in the organization of the field army, I propose to consider this under two main headings :—

(1) Mobile Troops ; and
(2) Infantry Divisions.

Since the War there has been a tendency to decry the value of infantry, but it is, I think, becoming clearer that infantry, because of its flexibility and defensive power, must remain the backbone of modern armies—whether it happens to be transported in mechanical vehicles to the battle-front or not. In fact one can no more imagine an army operating solely with armoured fighting vehicles or aeroplanes than a pugilist possessing immensely powerful hands and feet and no trunk. Valuable and even essential as armoured fighting vehicles may be in war, they still need a well-protected base from which to work ; their supplies must be assured, and they must be provided with protection when at rest. When not on the move an armoured fighting vehicle immediately becomes vulnerable to many forms of attack, since it relies largely on its speed for protection. We must also remember that we may have to provide military forces for operations in types of country where vehicles such as tanks cannot operate effectively. It seems, therefore, safe to assume that infantry divisions will, in the future as in the past, provide the backbone of modern armies, although

I do not wish to imply that the organization, armament, and transport of the infantry division must remain as it is to-day.

Mobile Troops.

To-day we possess one cavalry division and one independent tank brigade.

The cavalry brigades still remain on a horse basis, although the first-line transport is mechanized, and light two-seater cars are provided for reconnaissance and inter-communication purposes. In addition, of course, armoured car units are included in the cavalry division for reconnaissance.

The tank brigade has recently been organized into one battalion of light tanks and three mixed battalions which contain both light tanks and medium tanks. The potentialities of this tank brigade have already been demonstrated in exercises which have taken place. Various lessons, however, have been learnt, one of the most important of these being that the working range of a completely armoured formation is limited, unless it be supported by protective troops which can both move swiftly and work on the ground. Bridges and defiles over or through which the armoured force has to pass must be seized and held. The door for retreat after a raid must be kept open. The " B " echelon transport—at least 200 vehicles—which carries spare crews, spare parts, petrol and supplies, must be protected both on the march and at rest. These facts tend to show that the tank brigade, in order to fulfil its functions effectively, should not be an isolated formation, but should, when occasion demands, have the support of other troops capable of keeping up with it during its operations.

As our means are limited and we must, as far as possible, rely upon existing resources, we are considering whether the cavalry division and the tank brigade should not be fused together so that they can operate as a complete mobile formation, including both armoured and unarmoured units. Such a mobile division might then consist of the following :—

(1) A reconnaissance wing consisting of armoured-car units and light cars ;

(2) A tank brigade ;

(3) A mechanized cavalry brigade, in which the men would be carried in light motor vehicles organized on a tactical basis, rather on the lines of the French *dragons portés* ;

(4) Mechanized horse artillery, engineers, signals, etc.

Naturally this formation, like all military formations, would require

adequate air support, but I have no time to deal with the important question of air co-operation.

In order to explore the problem in more detail, it is proposed next year to carry out trials with one cavalry regiment carried in motor vehicles, possibly supported by a detachment of light tanks, the transport being allotted to it on a tactical basis, i.e., light cars for reconnaissance, light lorries or trucks for carriage of squadrons.

I should add that for many reasons it is considered that divisional cavalry should remain on a horsed basis, while it is also considered that one cavalry brigade should be retained as an independent formation on a horsed basis for use in countries unsuitable for wheeled transport, and also for working the reliefs with horsed regiments required in foreign garrisons.

It is often asked whether it is intended to create any additional tank brigades. The answer to this is, I think, that until the country becomes very much richer than it is at present, the formation of additional tank brigades in peace-time—except in cadre form—will not be possible.

Infantry Divisions.

It is, I think, true to say that for modern continental warfare the organization and tactics of the infantry division should be based on the fire of infantry in defence, and on the co-operation of all arms in attack.

On the other hand, colonial warfare—and we are more of a colonial than a European military power—is liable to produce a tendency to regard infantry more from the aspect of the unit, and this has possibly encouraged us to evolve such organizations as the mixed battalion, which, as more and more weapons are necessary to enable infantry to cope with the conditions of modern war, becomes increasingly difficult to train in peace and to maintain in war, besides being uneconomical, as it may result in supporting weapons being locked up with units which do not require them in all circumstances. From the divisional aspect, therefore, the infantry brigade, and not the battalion, should now, I suggest, be regarded as the tactical unit. I therefore propose to consider, firstly, the organization, armament and transport of the infantry brigade, and then of the various divisional units required to support the brigade.

Brigade Organization.

At the present moment the infantry brigade consists of four mixed battalions, and these battalions contain the following weapons: the rifle, light automatic (including light automatics for anti-aircraft

defence), machine gun, grenade, 3-in. mortar, and anti-tank weapons—the last being for the moment only in experimental or token form. If the Brigadier wishes to obtain more machine-gun support for certain of his units, or if some of these are more threatened than others by attack by armoured fighting vehicles, he can only redistribute the necessary weapons by withdrawing them from battalions. In addition, the training of the personnel of such mixed battalions has become a very complicated problem.

It is therefore proposed to experiment next year with an infantry brigade reorganized so as to consist of :—

Headquarters ;
3 rifle battalions ;
1 machine-gun battalion.

The rifle battalions will be completely homogeneous, consisting of four rifle companies and one mortar platoon. The machine-gun battalion of the brigade will consist of three machine-gun companies and one anti-tank company, and the organization would be such that decentralization is possible.

Briefly, the advantages of this new brigade organization would appear to be :—

(1) A centralized control of supporting weapons, permitting of accurate adjustment to the ground and situation ;

(2) Greater efficiency and staying power in the rifle battalions, which will now have four homogeneous companies and will be able thus to operate in depth with greater ease ;

(3) Simplicity in training ;

(4) A more fluid treatment of infantry tactics in the rifle platoon, which will be able to ring the changes on its armament according to its task ; it may either act as a purely rifle unit or it may be able to bring as many as three light machine guns into action in attack and defence.

Other Supporting Weapons.

So far, I have only mentioned machine guns, mortars and anti-tank guns as supporting weapons, but it is clear that more support besides that of artillery will be required if the infantry is to be able to deal with hidden machine guns, barbed wire, and strongly fortified positions.

Infantry Tank.—It has been decided that army tank battalions are to be provided on the scale of one battalion per infantry division. The tank in these units would be of a different pattern to those in the

tank brigade. Its role would be: to clear a passage through wire; to deal with unneutralized machine guns; and to keep up the momentum of the infantry attack.

The primary requirements of such armoured fighting vehicles are armour and inconspicuousness. Speed and radius of action will have to be sacrificed to some extent in order to obtain the necessary thickness of armour; while the armament will probably consist of machine guns and anti-tank weapons. The tank itself is still in an experimental stage, but we hope that before very long it will be possible to go to production.

Armoured Machine-Gun Carrier.—Another difficulty which we are trying to overcome is that of bringing the Vickers machine gun rapidly into action in support of infantry for such purposes as consolidation of ground or covering rearguard actions; accordingly it is proposed next year to continue experimenting with armoured machine-gun carriers. The object of these armoured carriers is to enable machine guns to advance rapidly over fire-swept zones and to come into action, if necessary, from the vehicle though not on the move, as the latter would practically necessitate the provision of a tank. The machine gun will, of course, be capable of being taken out of the vehicle and fired from the ground when required. These armoured carriers, if found to be successful, would be incorporated in the companies of the machine-gun battalion.

Anti-Tank Armament.—For the last few years we have been experimenting with various types of anti-tank gun firing a solid bullet. But whilst these experiments have been going on the armour of tanks in foreign armies has tended to increase yearly. Moreover, it is, I think, becoming clearer every year that, while it is possible to obtain an anti-tank weapon firing a solid bullet which will penetrate any armour likely to be encountered at moderate ranges, such a weapon will not necessarily stop a tank. Also, if a really high performance is to be obtained, the weapon inevitably becomes too heavy to be handled by one man. Consequently, a satisfactory solution of this question of anti-tank defence is a very difficult problem, and one which is being carefully considered at the present time. I cannot say what the eventual answer may be. Possibly it may be to provide battalions, and in fact all units, with a light and handy anti-tank weapon for their local defence and to provide heavier and more powerful weapons for " area defence."

Light Automatics.—It is hoped that the Army will soon be re-equipped with a new and up-to-date light automatic gun. The Lewis gun proved invaluable in the late war, but it possesses many defects, and must now

be definitely considered as an out-of-date weapon. I am not yet in a position to state what weapon will be adopted to replace it, but a decision on this point is likely to be reached in the near future, and it is clear that, whichever of the guns at present under trial is adopted, it will be infinitely superior to the Lewis gun.

The new anti-aircraft light gun mounting will also make it possible greatly to increase the number of battalion anti-aircraft light machine guns.

Air Defence.

For field operations we already possess one air defence brigade, which includes anti-aircraft guns, searchlights, and light machine guns. Such formations will be essential for the protection of bases, lines of communication, railheads, and particularly vulnerable points in the rear areas. It will probably be necessary before long to form a second regular air defence brigade similar to that now in existence.

Artillery.

The necessity for adequate artillery support for infantry attack was probably one of the most obvious lessons of the late war. At the moment our divisional artillery consists of three field brigades and one light brigade of 3.7-in. howitzers. In addition, we have army field brigades on the scale of one per division, each consisting, like divisional artillery, of three 18-pounder and one 4.5-in. howitzer batteries. Now that the mortar has become the primary close support weapon of infantry, it is considered that better value can be derived from available artillery resources by converting the light brigades into additional army field brigades; and it is proposed to begin this conversion next year. We shall thus have, in addition to the present divisional artillery, mechanized army field brigades on the scale of two per division, which would allow of a division on a "decisive" front being supported by a total of as many as six brigades, if required.

The fact that all army field brigades will be mechanized will enable a commander to adjust the allotment of artillery to circumstances very rapidly. Although the time will come when all the divisional artillery will be mechanized, it is doubtful whether this will be possible for some years, owing to the great expense involved.

It is also worth noting in passing that the provision of wireless communication within artillery brigades has greatly increased the speed and accuracy with which artillery support can be obtained by infantry.

Infantry Mobility.

Although infantry fight on foot, they may be moved to their deployment area by train, aeroplane, mechanical transport, bicycle, etc. It is essential, therefore, that the first-line transport of infantry should be capable of a wide range of efficiency. Not only must the supporting weapon be able to be moved rapidly to required areas, but the transport as a whole must be capable either of accompanying an infantry unit on the march or of keeping up with it when carried by mechanical transport. The mechanization of infantry first-line transport will meet these needs, and, in addition, the increased haulage power should enable the weight carried by the soldier to be reduced, whilst it should decrease the vulnerability of the transport, at the same time giving it a greater capacity for dispersion of vehicles.

Experiments have been conducted for some time with mechanized transport for infantry; these have gone so far that it is proposed next year to start mechanizing the transport of some brigades at Aldershot.

I should add that it is proposed to increase the transport of the rifle company from one to three vehicles so as to enable the company commander to carry with him everything he needs, such as light machine guns, grenades and entrenching tools. It will also be possible to keep the "B" echelon transport further out of the fight than heretofore, with advantage. Lastly, it may be possible to bring infantrymen's greatcoats and baggage into first-line from the second-line transport.

I have already mentioned that infantry may be moved to their deployment area in mechanical transport. According to present plans any field force sent overseas would be accompanied by reserve mechanical transport companies capable of carrying one infantry brigade per division in the force. In such circumstances it is essential that the first-line transport should accompany the column, and the mechanical transport vehicle we have in view will be able to do this with ease.

Other Divisional Units.

I cannot deal in detail with the many other developments taking place in the modernization of the infantry division, but the following should be mentioned:—

Engineers.—All the transport of engineer units will be mechanized, and power tools are being provided. The latter will be worked by compressors trailed behind lorries, and will supply power for wood-borers, power-saws, drills, pneumatic riveters, etc. This mechanical equipment will increase engineer output in many directions, such as demolitions, the provision of road blocks, and constructional work generally.

Controversy has been active for many years on the question of whether engineer units in divisions should be completely mechanized, that is that the personnel, as well as the equipment, should be carried by mechanical transport. We have finally reached the conclusion that, in spite of the obvious advantages of such a course, complete mechanization is not possible owing to the increase in the already vast amount of lorry transport in any mobilized force. Accordingly I think we shall have to be satisfied by the compromise of providing the Commander of Royal Engineers with a pool of lorries with which, if necessary, he can move approximately one-third of the divisional engineers; there may also be an increase in the number of bicycles allotted to field companies.

Signals.—In recent years the main development in the Signal Corps has been the introduction of wireless, which is of particular importance for ensuring communication between moving columns and vehicles. Unfortunately, we cannot yet rely entirely on this form of communication; for reasons of secrecy, and owing to the possibility of jamming, line and cable communication will at times also be required, and the introduction of wireless has therefore resulted in a considerable swelling of signal units.

Another point of interest connected with Signals is that, whereas in 1914 we could rely very largely on the Post Office to supply our requirements in telegraphists on mobilization, this is no longer possible, as Morse telegraphy has died out in civil practice, tele-printers being now used in its place. Now, therefore, we have not only to provide peace-trained soldiers for all Morse telegraphy, but we also have to obtain expensive tele-printers for long-range cable work: as I mentioned before, the Army in its organization must keep in line with developments in civil life.

Protection against Gas.

In spite of Covenants in which the nations have agreed not to employ gas in war, we cannot exclude the possibility of having to protect ourselves against this weapon; with the natural result not only that we have to provide gas masks, goggles, protective clothing, etc., but that we have to study the question of decontamination of personnel, material and ground. Investigations into all these questions are being actively pursued.

CONCLUSIONS.

It will, I think, by now have become clear that the organization and appearance of the Army of to-day is very different to that of 1914. Although I realize that all figures must be treated with great circum-

spection, the following comparison of the relative numbers of rifles and of support weapons allotted to the Army in 1914 and 1934 are of significance :—

	1914	1934
Number of guns of all kinds per 1,000 infantry rifles	7·7	47
Mortars per 1,000 infantry rifles . .	*Nil*	8.6
Machine guns, automatic and anti-tank weapons per 1,000 infantry rifles .	2.8	132

These figures serve to show what an immense increase has been made in the proportion of supporting weapons to infantry rifles.

Other points of interest which emerge from a comparison of the present field force with that of 1914 are :—

(1) The percentage of troops whose sole function is fighting—cavalry, artillery, infantry and tanks—has fallen from 74 per cent. in 1914 to 58 per cent. now, whilst the maintenance and supply services show large increases. For example, ordnance personnel has increased by over 500 per cent. as a direct result of mechanization.

(2) The proportion of engineers per division, counting all Royal Engineers in a field force, has increased by about 470 per cent.

(3) The amount of signal personnel has more than doubled.

As a result of all these changes the modern force has far more " punch " in attack and is very much stronger in defence, whilst its mobility and flexibility have increased with mechanization.

Nevertheless, a word of warning is necessary. We must bear in mind that when a mechanical vehicle is added to a field force, not only is it necessary to add an average of one and a half drivers, but about another man must be added for the maintenance and workshop echelons in rear. In fact, if the whole of the Army were motorized—that is, all personnel were carried in motor vehicles—more than 50 per cent. of the total strength of a field force would consist of maintenance and supply personnel in rear of the actual fighting troops ; indeed we might reach a stage when the tail not merely wagged the dog, but paralysed the dog altogether.

In conclusion I will just summarize very briefly the main points I have put forward :—

(1) We have to be prepared to deal with many contingencies. A European war is only one of them. But this is undoubtedly our most difficult and expensive commitment.

(2) In reorganizing and modernizing the Army, definite limitations are imposed on us by such factors as the Cardwell System, the Army in India, and the general financial position of the country.

(3) Mechanization is imperative: first because the horse is dying out, and secondly owing to the immense tactical advantages to be obtained by the employment of armoured fighting vehicles.

(4) Mechanization, however, has to be watched very carefully. Not only is it extremely expensive, particularly in the matter of war reserves, but if carried to extremes it will result in the tail of the Army becoming so long and so heavy that the whole force will become immobile.

(5) What we really require is a well-balanced force for the " average role " we are likely to have to perform. The backbone of the Army must still consist of infantry divisions, and the tendency in the reorganization of these is :—

(*a*) To increase the support for the infantry rifleman ;

(*b*) To mechanize transport in order to increase the speed of distributing support and to enable the foot soldier to be moved rapidly, if necessary, by mechanical transport to the area of deployment.

(6) For modern war we require a strong and up-to-date tank formation, which may be incorporated eventually in a mechanized cavalry division consisting of armoured and unarmoured vehicles capable of fulfilling all the roles required of a mobile force, i.e., reconnaissance, protection, and attack.

(7) We rely more and more on industry for mobilizing a modern army and keeping it equipped in the field. Production must be most carefully planned, or a modern force will soon melt away.

(8) We still have a long way to go, and if an efficient modern force is to be available, if and when required, more money than has been provided in the past will have to be found.

(9) Lastly, a point to be emphasized is that a war has never yet been won by material alone. In the end it is the man behind the gun, or the man in the tank, who counts. Unless he is well trained and possesses the will to win, the provision of the best and most up-to-date material in the world will not ensure success.

DISCUSSION.

The Cardwell System.

General Sir Robert Whigham : I only want to say one word about our old friend the Cardwell System. The Lecturer has said that this system imposed considerable restrictions on the form of any organization or reorganization. That is perfectly true, but I know that there are still a good many regimental officers who think that the Cardwell System is nothing more than the linking of one infantry battalion with another. That again, to borrow a phrase from Colonel Macready, is rather like mistaking the tail for the dog. The Cardwell System was introduced

by Mr. Cardwell, Secretary of State for War, in 1870 with the assistance of Colonel Garnet Wolseley, as he then was, and General Sir Patrick McDougall, who was Commandant of the Staff College. Its basic principle is that the troops maintained at home have a dual function. First, they have to maintain the troops abroad, in India and in the Colonial garrisons, and secondly they have to provide the nucleus of an expeditionary force, or strategic reserve. When Mr. Cardwell came into power he found no strategic reserve at all, and that was the reason for his introduction of the system, or policy, which bears his name.

That being so, two corollaries arise, to one of which Colonel Macready referred. He put it very clearly; that if this interchange of troops is to go on continuously, and if the expeditionary force is not to be hampered in its training for what may be required of it, then the general principles of the organization, training, and equipment, at home and abroad, must be similar: a counsel of perfection, but none the less true.

Corollary number two is sometimes overlooked. The main idea in Mr. Cardwell's mind was to provide a strategic reserve. From the introduction of the principle that the troops at home had to feed those abroad, the practice emerged that for every unit maintained abroad there must be a corresponding unit at home. It follows from that that the number of units maintained abroad determines the minimum number of units kept at home. That is the point. Mr. Cardwell and his advisers never said that there must not be more units at home than there are abroad, though that fact is sometimes lost sight of. However, that is a matter of higher policy and not for us here. The great advantage of the Cardwell System is that it fulfils this dual function. So long as we adhere to it in principle we must have a minimum number of units at home from which to organize a strategic reserve.

But when we come to implement it, we encounter considerable difficulties, which are increasing nowadays owing to the very factors which Colonel Macready has mentioned; the increase in the number of weapons and forms of organization. This experimental organization which is to be tried out in one infantry brigade, whatever merits or demerits it may have in other directions, should in the long run simplify the drafting question, which is the main difficulty in implementing the Cardwell System. If it is adopted, there will be definite machine-gun units, and so long as the authorities in India accept the principles of our organization at home, there will be other machine-gun units in India, and this will make the drafting problem which faces every infantry battalion—which is the unit always worst hit—considerably easier.

Machine-Gun Carriers.

Captain J. A. Barlow, West Yorkshire Regiment: The Lecturer referred to machine guns on lightly armoured carriers, and the possibility of firing from the vehicle at rest. Will that not provide a sitting target for the enemy's anti-tank guns, on an object which is not suited or meant to withstand a weapon of such a calibre?

The Lecturer: No. The point is that this armoured machine-gun carrier is not intended to precede the infantry and do the work of a tank co-operating with infantry at all. What we want to do is to get the machine gun up to support the infantry as quickly as possible. Presumably the enemy's anti-tank guns, which can only penetrate armour up to a few hundred yards, will not necessarily be within range of this fire-swept zone of which I am talking. The idea is to get the

machine gun up close by mechanical means instead of having to carry it by hand in rather difficult circumstances. The carrier is only intended to be proof against rifle fire. I quite agree that if there is any question of coming up against an organized anti-tank defence, a carrier of that kind could not be used. The gun is intended to be fired normally on the ground, but in order to be able to develop machine-gun fire in certain circumstances without delay it is necessary that the gun should also be able to fire from the vehicle.

THE CHAIRMAN: Its primary role would be to fire from the ground, and the armoured carrier is there to get it forward quickly. That is the point.

CAPTAIN J. F. ASHTON, Border Regiment: Taking the establishment as one machine-gun battalion per brigade, in the event of a war many more machine-gun battalions will be required. Is it possible to know what form of training is intended to ensure that such a large extra supply may be maintained without breaking down? Is it going to be on the system of units, or is there to be a training centre for machine gunners in war or peace?

THE LECTURER: No; but if the suggested organization is adopted there will be one machine-gun battalion in each brigade throughout the forces at home, and it will have its foreign link and a training depot at home for training the reinforcements in time of war. The peace establishment of a machine-gun battalion, both as regards men and vehicles, will of course be correctly related to war requirements.

CAPTAIN ASHTON: Yes, but, supposing that the unit obtains its recruits from the depot in peace-time rather than from the battalion, will that depot be sufficient for the increase required in the event of war, if it has to provide an extra force for the Continent?

THE LECTURER: The answer to that raises a very big question. In our plans we naturally arrange for the provision of a very large number of additional training depots for everything. It does not merely apply to machine guns, but also to tank units, artillery and everything else. Speaking from memory, we have well over one hundred training depots in our mind which are worked out on paper. A certain number of these would, of course, be purely for machine gunners.

HORSES AND MECHANIZATION.

LIEUT.-COLONEL O. W. WHITE (late Dorset Regiment): During recent years there have been articles in foreign Service periodicals pointing out that before any nation can embark on hostilities it must be assured of an enormous supply of horses, because it will take six months to provide sufficient mechanical transport to replace them. How do we stand in this respect?

THE LECTURER: Two rather interesting points arise out of that question. First of all, I cannot tell you the reason, but the fact is that we are more "unhorsed" in this country than in any other country in Europe. I happened to look at some figures the other day, and I discovered that Germany to-day has some 3,400,000 horses. In 1914 she had 3,800,000 horses. It is rather curious that, although Germany has had a good bit lopped off her, she still has very nearly the same number as before the War. In Russia there are supposed to be 38,000,000 horses. The fact is that we are being driven to mechanical transport, possibly a bit earlier than they are, simply because we cannot find the horses.

The question of providing the number of vehicles required really comes under the heading of industrial mobilization, to which I referred. As regards ordinary

wheeled transport of the lorry and car type, I do not think that there is any ground for undue misgiving. The firms we have in this country can provide an enormous output of the ordinary vehicles. It is, however, the specialist vehicle, the tank and so on, which presents a very different problem, for it will take months to organize the manufacture of these vehicles.

THE CHAIRMAN:

Colonel Macready has given a very true picture of the difficulties that face us at the present time in trying to bring the Army up to date, and to meet all the various demands that may be made upon it. He told you of the various problems that face us and of the various duties we have to perform. From this you will see that we have to devise an Army, which may have at least four roles to perform, within financial limits which are fairly narrow. One of the most important points Colonel Macready brought out was the danger of going too fast in mechanization. The more one goes into that problem, the more one realizes that, unless we go cautiously, we shall land ourselves in difficulties. First of all, if we mechanize too much, we may, as he told you, build up an enormous tail; and secondly, if we mechanize too quickly, we may find that in a year or two the larger part of the tanks or machine-gun carriers, or whatever the vehicles are, may very probably be out of date. I am therefore quite convinced in my own mind that what we have to do is to go steadily along, going to production to a limited extent whenever we have found a really good article and whenever we can get the money, and at the same time continue to experiment as hard as we can with as simple forms of vehicles as we can find, so that if war looms on the horizon again we may be in a position to go to production at once with the latest pattern on the stocks. I am quite certain that that is the only way in which we can possibly carry on with our limited resources.

I think I should merely be wasting your time if I emphasized any more of Colonel Macready's points, because they were extremely clearly put: his arguments —like, I hope, our Army—were very well balanced; he did not over-exaggerate, but he did not under-estimate. One thing he did not say, which perhaps I may be allowed to mention, is that the soldier, when he gets to the War Office, and on the Army Council, labours under this great difficulty: if he tries to bring the Army up to date and make it efficient he is liable to be accused of war-mongering and of trying to start a new war. If on the other hand he sits back and lets things take their course, then, when trouble begins, he is accused of a lack of imagination and of foresight. The result is that the Army Council have to steer a very difficult course. I feel myself, even at the risk of being called a war-monger, that to allow the Army to be deficient of reserves and to lag behind in modern equipment would be criminal and unfair to the soldiers who are going to succeed us. Therefore, as far as we on the Army Council are concerned at the moment, we are doing our utmost on the lines which Colonel Macready has just described to bring the Army up to date, without any thought of stirring up a new war or of making trouble, either on the Continent or in the East.

The customary votes of thanks to the Lecturer and Chairman were passed by acclamation.

PASSCHENDAELE

THE Third Battle of Ypres, and particularly that section of it which culminated in the capture of the small eminence on which had once stood the village of Passchendaele, has recently been the subject of acute controversy, rivalling in intensity that which a few years ago raged round the battle of Jutland. As so often occurs when battles obtrude themselves into history written from a political point of view, success is wont to be judged not so much by any strategical advantage achieved, but rather by the part they played in enhancing the prestige of the nation's leaders. When it has been obvious to the public that an engagement has been a success, and when the price of that success has been small, then the Government preens itself in the reflected glory of the victorious commander; but if the course of the battle can only be understood by a trained mind, and the result has not been spectacular, there is little political capital to be made out of it, and the commander is liable to become the target for much uninformed criticism. Nor are there wanting technical critics who will seize upon the opportunity to condemn what they conceive to be the misuse of weapons or the misdirection of forces, solely with a view to promoting their own theories. So it was before the true course of events at the battle of Jutland and the influence of that engagement on the outcome of the War had been presented in their correct perspective. So it has been more recently, when misrepresentation of the achievements of the British Army under Haig in the late summer and autumn of 1917 have caused their efforts and sacrifices to be in danger of becoming misunderstood and undervalued.

In the absence, so far, of an official history of that period, it seems desirable to give a clear and unbiased account of the circumstances and policy which led up to those operations, of the strategic objects in view, and of the results achieved. As regards the two former it is best to rely upon known facts and official records rather than on personal impressions formed subsequent to events; while, for the results, the chronicles of our late enemy appear to be the most appropriate reference.

If we are to trace the course of events which brought about the Third Battle of Ypres to their origin, we must go back to the month of April, 1917. The French Commander-in-Chief, General Nivelle, who had replaced General Joffre in December of the previous year, had won the consent of both the British and French governments to a great

offensive. By his optimism he overcame the eleventh-hour misgivings of his own War Minister, M. Painlevé, and he secured the support of the British Cabinet. The grand offensive by the French which began on the 16th April had been preceded by "the brilliant preliminary operations by which the British Army at the battle of Arras captured the whole of the Vimy Ridge."[1] But by the evening of that same day Nivelle's "high hopes and confidence had withered." By the 20th April the French had lost 100,000 men and failed to obtain any material advantage.

The reactions to Nivelle's failure were profound and almost disastrous to the Allied cause. The French nation was horror-struck by the useless slaughter, while the morale of the French army was so badly shaken that the situation called for vigorous action by their British allies if the enemy was to be prevented from launching a dangerous offensive against what had become a serious weakness in the line of the Western Front. Moreover, to quote Mr. Churchill again,[2] "the hour was tragic. The U boat sinkings for April surpassing all previous records, had reached the total of 800,000 tons. The fatal curve was still rising, and in British minds it dominated everything."

It was in these circumstances that there took place in Paris a conference which was to decide the Anglo-French policy for the future conduct of the war. That conference was attended by Mr. Lloyd George; Lord Robert Cecil; Field-Marshal Sir Douglas Haig; General Sir William Robertson, Chief of the Imperial General Staff; his deputy, General Maurice; and Admiral Jellicoe, First Sea Lord, as British representatives. The French members were M. Ribot, Prime Minister; M. Painlévé, Minister for War; Admiral Lacaze, Minister of Marine; M. Léon Bourgeois; and Generals Nivelle and Pétain.

The purpose of this meeting was an exchange of views on the following subjects: the prosecution of the war and, in particular, of the anti-submarine campaign; the inadequacy of sea transport; and the question of the effectives to be maintained at Salonika.[3] . . . After various preliminary conversations, a full meeting was held at the Quai d'Orsay, when General Robertson read a memorandum in which he stated: "We, the military members of the Conference, have unanimously arrived at the conclusion that it is indispensable to continue offensive operations on the Western Front. . . . The members of the Conference are all of the opinion that we can attain our ends by ceaseless

[1] "The World Crisis, 1916–18," Part I, by Winston S. Churchill, p. 280.
[2] *Ibid.*
[3] French Official Account, Vol. I, Chap. XXX, p. 758 *et seq.*–literal translation.

attacks, having limited objectives in view, and by making lavish use of our artillery. We hope by these methods to realize our hopes with the minimum of loss. The above principles have been unanimously accepted, consequently it seems to us that the methods to be adopted and to be put into execution, the choice of the moment and of the place of the various attacks, are matters for the responsible Generals to settle ; the latter should henceforth examine and settle these questions."

The British Prime Minister had been " personally deeply committed by his facile acceptance of the Nivelle schemes to the offensive mood. He showed himself resolute to persevere. The British Army should be thrown ungrudgingly into the battle of attrition, and every effort must be made to induce the French to exert themselves unceasingly to the utmost. General Headquarters thus found in Mr. Lloyd George at this juncture a strong supporter." [1] At this conference he said : " We have wished to make sure that there was agreement between us on the principle of continuing the offensive with all our resources and with all our energies. . . ." Championing his case against his own Government, " We have no need," he went on, " to know the details which concern particularly those who have the direct responsibility for the military operations. We prefer that Generals shall keep their plans of execution to themselves ; when plans are put on paper for communication to Ministers it is rare that the Ministers are the only ones to know them. We do not seek to know the precise plan of attack, nor the number of guns or divisions engaged. It is essential that these details remain secret. . . ."

Ribot and Painlevé both interrupted to declare themselves in agreement with the rule that, apart from general principles and the outline of the plan, everything must rest with the Generals alone. Mr. Lloyd George continued : " In the name of the British Government we declare to you that we approve the military protocol which General Robertson has just read. . . . After full consideration, the British War Cabinet asks of its French colleagues to push the offensive during the course of this year with all the force of which our two armies are capable." The Prime Minister proceeded to dilate upon the importance of not leaving the enemy a single moment's rest [2] ; " if we stopped our offensive, or if we limited ourselves to small demonstrations, the Germans will say, ' the Allies are beaten, and by going on sinking ships we shall starve England and render the continuation of the War impossible.' " He concluded by urging the most extreme intensity of action throughout the whole summer.

[1] " The World Crisis, 1916–18," Part I, p.282.
[2] *Do.*, pp. 283–284.

The French Premier expressed admiration for the resolute language of Mr. Lloyd George and undertook to continue the offensive with the reservation that the reserves of France were not to be squandered. General Pétain, as French Chief of the General Staff, summed up that there was common agreement for the necessity : firstly, to continue the offensive ; and secondly, for the offensive to have limited objectives. He also emphasized the need " to insure absolute secrecy concerning the operations." He further elaborated his views by explaining the difference in meaning between " a limited attack " and an attack having " a limited strategic objective." " It is important," he said, " to grasp clearly the distinction between action in depth and action in breadth. . . . If it be desired in point of fact to contain and destroy the enemy's forces, it is an effort made in breadth which will give the best results." [1]

The members of the Conference separated in complete unanimity as to the general policy to be pursued, although it is obvious that the French Government did not entirely share Mr. Lloyd George's optimism. For this they had good reason. On the very day when the Conference ended a French division refused to enter the line. Although it was rallied to its duty, this was, as Mr. Churchill puts it, " the first drop before the downpour." The demoralization of the French Army was proceeding apace. Nevertheless, Haig sought to give effect to the decision of the Conference, so far as the British Army was concerned, without delay, and on the 7th May he summoned a meeting of his Army Commanders at Doullens. Before this assembly he announced his intention of transferring his main effort to the North, with the ultimate object of securing the Belgian coast and of obtaining further strategic results. The operations were to consist of two distinct steps :—

(1) The Attack of the Messines–Wytschaete ridge in order to cover the right flank during the next step, which was to be :

(2) The Northern Operations ; i.e., with Passchendaele as the objective, to be undertaken a few weeks later—this operation being intended to lead up to the recovery of the Belgian Coast.

Ever since he had assumed the office of Commander-in-Chief, Sir Douglas had strongly urged the necessity of recapturing the Messines ridge and of pushing the enemy back from the sea. Indeed, the matter had been considered as early as June, 1915, while on 14th January,

[1] French Official Account, Vol. I, Chap. XXX, pp. 785 *et seq.*

1916—that is, a few weeks after assuming the high command—he had directed General Plumer to study the question of retaking the ridge. Three months later, on 10th April, after studying the various schemes submitted to him, he desired that preparations, which were to include extensive mining, should be set in train for the attack. Soon afterwards these preparations were ordered to be hastened, since it appeared to Haig that, in the event of the Somme operations not meeting with success, the British effort might be switched over to Messines. The majority of the mines were in fact completed by the end of June, 1916, but ultimately the attack was not launched until the early summer of 1917.

The battle of Messines was timed to take place early in June, 1917; but on the 4th of that month General Pétain, who had succeeded General Nivelle as Commander-in-Chief of the French Armies of the North and North-East, was engaged in coping with a grave state of disaffection which was spreading rapidly throughout his command. In these circumstances he was compelled to withdraw his offer to assist in the offensive, and this materially altered the situation as it had been visualized at the Paris Conference early in May. Haig could no longer count on the promised co-operation of the French Army. Nevertheless the need for offensive action by the British was more, rather than less, imperative, and he ordered the attack to be proceeded with. On 7th June nineteen large mines were fired under the Messines Ridge, which was carried with ease, the enemy making no real attempt to recapture the ground. Encouraged by this striking success, Haig decided to realize the next stage of the programme.

Meanwhile, however, the temper of the British War Cabinet had undergone a considerable change since the Paris Conference. Not only was France a source of weakness rather than of strength, but Russia was lapsing into a state of revolutionary chaos, and a considerable peace party in England, headed by Mr. Ramsay MacDonald, was calling for a conference "to do for this country what the Russian Revolution has accomplished in Russia." Haig had been home and, according to his chief intelligence officer,[1] found that "every one of the Cabinet—Lloyd George, Bonar Law, Curzon, Milner, and even Smuts, vies with the other in pessimism. They all, headed by the Prime Minister, wanted to stop offensive operations for this year and save up our men and resources for 1918. . . . It looks as if the Cabinet wanted to hand the baby of casualties over to the Americans; not a very dignified role for Great Britain. . . ." The discussion, however, appears to have been brought to an abrupt end by the Admiralty representative

[1] "At G.H.Q.," by Brigadier-General John Charteris, p. 233.

telling the Cabinet that " it was no good thinking about what would happen next year ; there would be no next year of war, for the Navy could not keep going unless the Germans were turned out of the Belgian coast." Although the Cabinet were loth to accept such a pessimistic view of the sea situation, it compelled them to agree to the offensive being continued and, in the absence of any more promising alternatives, to concur in Haig's plan of operations being proceeded with. Returning to France on the 27th June, Haig found that General Pétain was prepared to assist him with a small French army. On the 30th of that month he definitely stated that the main purpose of the operations was the defeat of the German army ; that this could not be encompassed at one stroke,[1] and that he foresaw " very hard fighting lasting perhaps for weeks." He proposed to deliver a series of organized attacks on a large scale and on broad frontages. In his " outline of possibilities " which he issued to his Army Commanders, Haig said that the first stage of the battle should be directed towards securing the Passchendaele–Staden Ridge ; the second might be an advance to an approximate line Thourout–Couckerlaere, some 30 miles North-East in the direction of Bruges. During this latter phase the Fourth Army and naval forces would attack in the region of Nieuport and the Coast to the East.

The main attack was entrusted to the Fifth Army (General Sir Hubert Gough), in the centre ; it was to employ ten out of its sixteen divisions on the front Hooge–Pilckem (7 miles). The Second Army (General Sir Herbert Plumer) was to cover the right of the Fifth Army with five out of its thirteen divisions on a 6-mile front. The French First Army (General Anthoine) was to advance on the left of the Fifth Army with two out of six divisions. The Fourth Army (General Sir Henry Rawlinson), composed of five divisions, formed a separate force on the Coast, and was destined to act in conjunction with the Navy as soon as the Passchendaele–Staden Ridge might be taken.

The subsequent fighting may be summarized into eight distinct phases [2] :—

(1) Battle of Pilckem Ridge, 31st July–2nd August, with the capture of Westhoek, 10th August.
(2) Battle of Langemarck, 16th–18th August.
(3) Battle of Menin Road, 20th–25th September.
(4) Battle of Polygon Wood, 26th September–3rd October.
(5) Battle of Broodseinde, 4th October.
(6) Battle of Poelcapelle, 9th October.

[1] Cf. Ludendorff's plans for March, 1918. The Germans scarcely believed that the British could be defeated in a single operation, but Ludendorf disregarded his best advisers.

[2] Following the official Battle Nomenclature.

(7) First Battle of Passchendaele, 12th October.
(8) Second Battle of Passchendaele, 26th October—10th November.

On the 15th July the bombardment of the enemy front began, and was gradually intensified. Meanwhile the command of the air was being gained by the Royal Flying Corps. The first attack had originally been timed to take place on 25th July, but, owing to weather conditions, it was delayed until 28th July; then, because the French General Anthoine considered that his artillery had not had time to produce sufficient effect, it was further postponed until 31st July. At 3.50 a.m. on that morning the assault was launched. The first enemy line, 1,000 yards distant, was easily overwhelmed; the same result was attained in the case of the second line, another 1,000 yards distant, except on the right of the Fifth Army; at that point the enemy's machine guns had survived the bombardment, and so progress became slow and costly. In the afternoon it began to rain heavily, but in spite of the weather the French on the left and the Fifth Army in the centre had reached their first objectives. On the right of the Fifth Army the attack did not get on so well; but still the Second Army made its way forward until it was in line with the Fifth. Weather then rendered any general advance impracticable. There was some local fighting, during which, on 10th August, the line near Westhoek was much improved.

Then the wet weather ceased and the ground began to dry, so operations were ordered to be resumed on 16th August. Unfortunately rain fell heavily again during the night of the 15th–16th. In spite of this misfortune the whole of the objectives on the left, including the village of Langemarck and extending from a point over two thousand yards East of that place to the extreme French left, were attained. On the right, however, the gain of ground was again small. On the 22nd and again on the 27th some lesser attacks were made on the right by three corps of the Fifth Army, but on the latter day torrential rain caused a total cessation of the battle. The enemy thus gained a respite which enabled him to concentrate fresh troops and bring up reserves. Sir Douglas Haig accordingly decided to postpone his attack and to prepare another combined offensive. This time he proposed to extend the operation to the right so as to take in another three thousand yards of front. The main attack was to be delivered by the Second Army; for this reason it took over the right Corps sector of the Fifth Army, where II Corps had been relieved by the Australians.

On the 20th September the second offensive, known as the battle of Menin Road, was launched, when the Second and Fifth Armies

employed two and two-and-a-half corps respectively in the assault. The ground had dried to a certain extent, but unfortunately rain again fell on the night preceding the attack. It was proposed to make only a short advance on this day–not more than a thousand yards. The objectives, extending from near Gheluvelt to beyond Zonnebeke, were attained.

The second stage of the operation–the battle of Polygon Wood–was continued by the Second Army together with one corps of the Fifth Army on the 26th. An advance of 1500 yards was made, as a result of which practically all objectives were gained.

The third stage–the battle of Broodseinde–was carried out by the Second Army on 4th October, after this army had taken over another corps front from the Fifth Army. During this time the Fifth and French Armies remained almost inactive. The front attacked stretched from near Gheluvelt by Reutel and Broodseinde to beyond Poelcapelle; the ground to be gained formed a sickle-moon-shaped segment some two thousand yards deep. The right sector included the right of the ridge from which the Germans could observe Ypres itself. Owing to fears of the weather breaking once more, preparations for the attack were hastened and curtailed. Even so, rain did fall in abundance before the attack could get under way. Nevertheless, the result was an unqualified success; determined counter-attacks made by the Germans to relieve the summit of the ridge were utterly defeated. "An overwhelming blow had been struck, and both sides knew it. The objective was the most important yet attacked by the Second and Fifth Armies, and they had again done almost exactly what they proposed to do. . . . This was the third blow struck at Ypres in fifteen days with complete success. It drove the Germans from one of the most important positions on the Western Front. Notwithstanding their full knowledge that it was coming, they were completely powerless to withstand it." [1]

Haig's great offensive had now reached a critical stage. So far he could well claim that, in spite of exceptionally bad weather conditions, it had fared well. It had, undoubtedly, saved the whole situation on the Western Front at a time when, owing to the French mutinies and the Russian revolution, there was danger of a serious threat to our allies. In London, the mercurial Prime Minister was once more optimistic, and a letter bearing his signature, dated 16th October, 1917, but doubtless written some days earlier, conveyed the satisfaction of

[1] Australian Official History of the War.

the War Cabinet at the successes achieved by the British Commander-in-Chief and his armies in the following terms :—

> " The War Cabinet desires to congratulate you and the troops under your command upon the achievements of the British Armies in Flanders in the great battle which has been raging since 31st July.
>
> Starting in positions in which every advantage rested with the enemy and hampered and delayed from time to time by most unfortunate weather, you and your men have nevertheless continuously driven the enemy back with such skill, courage and pertinacity as have commanded the admiration of the peoples of the British Empire and filled the enemy with alarm.
>
> I am personally glad to be the means of transmitting this message to you and to your gallant troops, and desire to take the opportunity of renewing my assurance of confidence in your leadership, and in the devotion of those whom you command.
>
> D. LLOYD GEORGE."

Nevertheless, Haig was not blind to the formidable task which still awaited him. The next step was to be the capture of Passchendaele, but before embarking on it, on 5th October, he called a meeting of his Army Commanders. Brigadier-General Charteris appears to have summed up the situation concisely when he wrote in his War diary on that date [1] : " We are far enough on now to stop for the winter . . . unless we get fine weather all this month there is now no chance of clearing the coast. With fine weather we may do it. The Germans . . . would probably now be only too glad to remain quietly here and try elsewhere." But he adds significantly, " Anyhow, there are reasons far more vital than our own interests here that give us no option . . . it is a tremendous responsibility for Haig. Most of those at the Conference, though willing to go on, would welcome a stop."

There can be no doubt that one of the main reasons for continuing the offensive was the urgent representation of General Pétain [2] ;

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[1] " At G.H.Q.," p. 258.

[2] " I hope that the Official History will give the true story. The problem for us was how to prevent the Germans from attacking the French, who were then incapable of offering an effective resistance. The mere suggestion of *a pause* in our attacks in the North at once brought Pétain in his train to see me and beg me to put in another effort against Passchendaele without any delay. Knowing as I did what the state of the French Army was in 1917 (for Pétain told me more than once about his *awful* anxieties), I felt thankful when the winter came, and the French Army was still in the Field."—Letter from Earl Haig written 4th March, 1927, to Major-General Sir John H. Davidson. See *The Times*, 14th November, 1934.

another was the seemingly vital necessity for the Army to assist the Navy in its struggle with the submarine menace by recapturing the German bases on the coast.[1] Such an achievement, it appeared, would be a serious blow to the enemy's hopes of driving England out of the War by snapping the last slender thread of her sea communications; it might even prove the turning point in the whole course of events both by land and sea; the War might even be won before Christmas. The issues at stake were of the highest importance; yet the lateness of the year and the inclemency of the weather were bound to entail greater sacrifices than had originally been estimated.

Haig was not the man to flinch from responsibility or to try and shoulder it on to others. It was for him to decide, it was for him to take the risks of his decision. On 8th October he gave the order to continue the attack.

For the last three days it had been raining intermittently; on the morning of the 8th, however, drying breezes raised the hopes of the High Command. Unfortunately the afternoon brought a deluge, and the fates decreed that the launching of the attack on the Passchendaele-Staden Ridge should coincide with a general break up of the weather.

On the 9th October an assault was delivered by the Second, Fifth and French Armies on a front of 13,500 yards. In places the first objective was reached, and at the end of the day the left of the Fifth Army and the French had made good progress. But on the right the attack came to a standstill between the old line and the first objectives.

It was evident by now that those high hopes, which Mr. Lloyd George had emphasized at the Paris Conference were such an important factor in the prosecution of war, were not to be fulfilled that year. Nevertheless, on 12th October, at 5.25 a.m., the attack towards Passchendaele was renewed on a front marked by the Ypres–Roulers railway on the right, and Houthulst on the left. The Second Army and five divisions of the Fifth Army were engaged. But then once more rain fell in the night; so much so that Sir H. Gough suggested a postponement of the attack, though Sir H. Plumer, after consultation with his corps commanders, decided to continue the battle. On the flanks, in particular, some headway was made, although the sodden ground rendered all

[1] Actually, with the increasing employment of the convoy system, the most acute stage of the German submarine campaign was over by September, 1917; but the total loss of ships was still in excess of the total replacements. Admiral Bacon with his pontoons and monitors was still waiting to embark the 1st Division from Le Clipon for the combined assault on the Coast.

progress most laborious. On the 22nd the Second Army together with three divisions of the Fifth Army once more attacked; they attained all their objectives and repulsed all counter-attacks.

By the 25th a strong wind had improved conditions on the ground, so that a further attack was attempted by all three armies. But rain again fell in torrents, and progress was only made on the high ground. The surface had become a sea of mud, and there arose the question of calling a halt to the sufferings of the troops. But the British Commander-in-Chief was still not free to consider the interests of his own Armies alone. He still had to bear the burden of a crisis. Thanks to the continued offensive of the British Army, the French army, under General Pétain, had had time and rest to recover their morale to the extent that they had just made a successful attack at Malmaison (23rd October); but the Italian *débâcle* at Caporetto and the gravity of the situation on the Russian front rendered it urgent that the Germans should be given no opportunity for moving their troops to other theatres of the War. Consequently on the 30th October and again on 6th November attacks, resulting in short advances, were made. The Canadian Corps, which had relieved the Australians, at length gained possession of the village of Passchendaele. Then at last a halt could be called.

What was the effect of these three months of fighting on the enemy? The official German monograph, *Flandern, 1917*, states that no less than eighty-six German divisions had been engaged, of which twenty-two had fought twice.[1] During August there was no change in the German strength on the Western Front, but from early September onwards there began a steady flow of reinforcements from East to West. "Divisions," continues this authority, "vanished by the dozen into the battle, only to emerge from that witch's cauldron, after a short period, weak and worn out, often reduced to a miserable remnant"; and it adds, "significant symptoms of strain grew obvious." In Prince Rupprecht's diary for the 11th October there appears the entry: "Most perturbing is the fact that our troops are steadily deteriorating." Prince Rupprecht's Chief of Staff, General von Kuhl, in writing of the battle of Passchendaele, says that the field recruit depots had been drained. By the 1st November, he adds, "the average strength of the German battalions on the entire Western Front had dwindled down to 640 men. Except for the class of 1899, composed of 18-year-old youths, there were available for the replacement of casualties only the recovered wounded and such men as could be recalled from the Eastern Front."

[1] The total number of British divisions engaged was 51, plus 6 French.

He concludes with the expression of opinion that this situation (scarcity of recruits) " influenced the conduct of the war in a decisive manner."

That the Germans were able to find fresh armies to conduct their own offensive in 1918 must be ascribed to the collapse of Russia, which allowed of a transfer of over 500,000 men from East to West during the ensuing winter, that is to say, between November, 1917, and March, 1918.

In the course of an admirable summary of the results of the third battle of Ypres, Dr. C. E. W. Bean, the official historian of the Australian Imperial Force in France, discusses the alternatives to the British offensive on the Western Front.[1] A " desperate search," however, " failed to produce any upon which the political leaders could agree." Other courses which found a measure of support were a combined offensive either on the Italian or on the Salonika front. But " in both these theatres not only were the natural difficulties at least equal to those of Flanders, but anything less than overwhelming success of the Entente could be watched by the German command almost with indifference. But in Flanders there could be no question of indifference." The final verdict of history on these operations will probably agree with this writer that " in its main object the offensive succeeded "[2]; in other words, Haig was justified in his momentous decisions.

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[1] Official History of Australia in the War, Vol. IV, p. 938.
[2] *Ibid.*, p. 940.

THE PORT OF LONDON AUTHORITY

By Sir David J. Owen, Kt.

On Wednesday, 5th December, 1934.

Admiral Sir William Goodenough, G.C.B., M.V.O., in the Chair.

The Chairman, in introducing the Lecturer, remarked that Sir David Owen brought with him a ripe experience of the Mersey, Goole, and Belfast, in addition to that of the General Manager of the Port of London Authority, all of which places had benefited by his administration.

LECTURE.

THE Port of London Authority is not quite twenty-six years old, but in order adequately to appreciate the full scope of its functions and responsibilities it is necessary to know something of the steps that led to its formation. So, to begin with, I will give a brief outline of its history.

The name of London is undoubtedly of Welsh origin, and it is probable that at the dawn of historic time on this island it was a Celtic settlement and a trading centre of some importance. It is certain that hundreds of years before the appearance of the Romans in Britain some of the inhabitants had attained to a relatively high standard of civilization, for they were agriculturists, manufacturers and traders with a monetary system, and they were engaged in overseas trade.

London owes its existence to the natural advantages of its site. Originally, no doubt, impassable marshes prevented access to the North and South banks of the Thames below where London is now situated, but somewhere near the position of the present London Bridge the river was approachable on both sides, and it is likely it was fordable there. This ford would form the quickest means of communication between the territory now known as Kent, South of the broad estuary of the Thames, and what we now know as Essex, on the North side. While the ancient Britons had no roads as we understand them, they had numerous trackways, many of which converged on London, and a good deal of traffic must have passed through the town.

Archæological evidence of conditions in these very early times may be disputed, but we are on safe historical ground when we come to the

Roman period. The first recorded historical reference to London is the oft quoted one of Tacitus, who A.D. 61 described Londinium as the chief residence of merchants and the great mart of trade and commerce. The Romans during their occupation of this country usually adopted the British names of places, in a Latinized form of course, and thus the Llundain of the Britons became the Londinium of the Romans. There are several allusions to London in early historical chronicles after the first century of this era, and it is evident that by the year 527 London had become the chief town of the East Saxons. The Venerable Bede wrote that in the year 604 it was the mart of many nations whose traders came to it by sea and land, and, incidentally, we also know that in that year London had a bishop of its own.

The town underwent many vicissitudes during the Middle Ages. It was held by the Danes during the greater part of the IXth century, but in the last days of that century it was captured and rebuilt by King Alfred the Great, whose policy of encouraging shipbuilding for trade and defence purposes had a marked effect upon the business of the Port. The Norman Conquest brought England into closer relationship with Europe. Merchants from Normandy, Flanders, Italy, Spain, and other European countries came to settle in London, and they helped to enlarge the city's foreign trade. Various monarchs during the Middle Ages deliberately encouraged alien merchants to come to London with a view to developing industry and commerce. As early as the VIIIth century, a band of German traders, known as the Easterlings, had frequented Billingsgate. The Easterlings developed into the Hanseatic League and obtained such extensive privileges and protection that the Hanse merchants gradually absorbed the control of the greater part of London's foreign trade. The League had its headquarters at the Steelyard, on the site of the present Cannon Street Railway Station, and flourished there until expelled from the country by Queen Elizabeth in 1598. By that time the foreign trade of London was passing into the hands of the Merchant Adventurers (incorporated in 1505): an association of Englishmen who became shipowners as well as merchants.

The XVIth and XVIIth centuries witnessed a great march forward in the commercial development of the English people, accompanied by an enormous expansion of the trade of the Port of London. Those were the days when the spirit of enterprise and adventure entered into so many of Britain's sons. Sir Hugh Willoughby and Richard Chancellor sailed from Deptford in 1553 on an expedition promoted by London merchants which led to the formation of the Russian Company. The Turkey Company, the East India Company, the Hudson's Bay Company, and other similar ventures all came into existence during this period

under the stimulus of promises of monopolies to those companies that should first open up communication with undiscovered countries. Hawkins, Drake, Raleigh, Frobisher, John Davis, and other famous seamen, all associated with the Thames, scoured the high seas and laid the foundation of the world commerce of the English-speaking people. English merchants were not slow to take advantage of the sack of Antwerp by the Duke of Parma in 1585. Up to that time Antwerp had been the centre of European trade; but by the end of Queen Elizabeth's reign London had become the commercial centre of the civilized world.

For many centuries ships entering the Port of London were small and of shallow draught, and their cargoes were dealt with while the ships were beached or anchored at the side of the stream. Later on it became necessary to provide small piers or platforms of stone or timber at which the vessels could lie and be discharged and loaded. In course of time a great many wharves and quays became established on the riverside in the vicinity of London. The sites of two of the earliest quays of which much is known—Queenhithe and Billingsgate—are still used as landing places for goods. The Great Fire of London in 1666 destroyed most of the wharves and warehouses in the Port, and the new ones which sprang up in their stead were built on improved lines. Certain of them, named "legal quays," were used for general trade, while others, called "sufferance wharves," were subject to conditions enforced by the Commissioners of Customs.

The trade of the Port of London had very greatly increased by the end of the XVIIIth century, but owing to the insufficiency of moorings, quays, and warehousing accommodation, there was continuous congestion of shipping in the river which caused great delay, loss, and inconvenience to shipowners and merchants. Plundering and smuggling were rife, and the unsatisfactory conditions gave rise to such insistent agitation for reform that Parliament, in 1796, appointed a Committee to enquire into the best way of providing proper accommodation for the increased trade and shipping of the Port. The Committee did not succeed in making any definite recommendations, but three years later a Parliamentary Committee, which had been considering a proposal of the West India Merchants, stated in their report that "the establishment of docks appears to the Committee to have so many advantages which a tide river cannot under any circumstances afford independent of them, that your Committee would consider any plan for the improvement of the Port imperfect of which Wet Docks did not make a part."

The scheme of the West India Merchants to construct two docks on the Isle of Dogs was then sanctioned, and the work was proceeded

with at once. The docks were named the " West India Docks ", and were opened on the 27th August, 1802. They were the first docks, in the modern sense of the term, built in the Port of London, although a dock had been constructed at Rotherhithe as early as 1696 for the safer anchorage of ships. An intensive period of dock construction followed the opening of the West India Docks, and continued until nearly the end of the XIXth century. The London Dock was opened in 1805 ; the East India Dock in 1806 ; the St. Katharine Dock in 1828 ; the Royal Victoria Dock in 1855 ; the Millwall Dock in 1868 ; the Royal Albert Dock in 1880 ; and the Tilbury Docks in 1886. The Surrey Commercial Docks system came into existence, dock by dock, between 1807 and 1876.

All these docks were built by private enterprise, and their ownership became concentrated into four separate concerns—the East & West India Dock Company, the London & St. Katharine Docks Company, the Millwall Dock Company, and the Surrey Commercial Docks Company. The first two of these companies in 1889 entered into a working arrangement under a Joint Committee, and in 1901 became amalgamated under the title of the London & India Docks Company.

For some time all went well with the dock enterprises, but towards the end of the XIXth century a period of exhausting competition ensued between the various dock companies and the proprietors of public wharves on the riverside, with the result that conditions in the Port became far from satisfactory. All the companies were left with insufficient financial resources to carry out the improvements and developments which changing conditions demanded. The importance of the enormous trade that the Port of London had so long fostered was recognized by the Government of the day, who appointed a Royal Commission to look into matters. This Commission presented their Report in 1902. After a good deal of delay, the outcome of the Commission's labours was the passing by Parliament of the " Port of London Act 1908 ". This Act created a new authority or public trust, called the " Port of London Authority ".

I have referred to the dock undertakings, and it must be remembered that the dock companies had no jurisdiction over the river. The history of the early control of the Thames is obscure. We know nothing of it in Roman times and for some time afterwards. Later, the control of the waterway was apparently vested in the King of England. By the XIIth century, the Corporation of the City of London seem to have become possessed of some jurisdiction over it, and in time they came to have full sway, their authority being expressed in various Royal Charters. The Corporation of London ceased to control the river in

1857, when a separate body called the Thames Conservancy was formed and vested with powers for its preservation and regulation. No further change in the administration of the Thames took place until the passing of the Port of London Act of 1908.

The Port of London Authority came into existence on the 31st March, 1909. The Act stipulated that it should consist of twenty-eight Members. Ten Members were to be appointed—one by the Admiralty, two by the Board of Trade (now the Ministry of Transport), four by the London County Council, two by the Corporation of the City of London, and one by Trinity House. The other eighteen Members were to be elected by the payers of rates, wharfingers, and the owners of river craft. The Authority had power to appoint a Chairman and a Vice-Chairman from outside the membership if it deemed fit, but the first Chairman was to be nominated by the Government. They appointed the late Viscount Devonport—then Sir Hudson E. Kearley, M.P., who as Parliamentary Secretary to the Board of Trade had been closely associated with Mr. Lloyd George, then President of the Board of Trade, in all the proceedings and negotiations that had led to the passing of the Bill. I must not omit to mention the part played by organized labour in the deliberations of the Authority. It is stipulated in the Act that, with a view to providing for the representation of labour on the Port Authority, the Ministry of Transport shall select one of their appointed Members after consultation with such organizations representative of labour as the Ministry think best qualified to advise them upon the matter. One of the Members of the Authority appointed by the London County Council is selected in like manner. The result is that there are always on the Authority as Members two labour union leaders.

Before dealing with the manner in which the Authority have been organized, I must explain what their functions are. The Act transferred to the new Port Authority the undertakings and powers of the old Dock Companies, the powers of the Thames Conservancy below Teddington and certain powers of the Watermen's Company. The position then was that the whole of the tidal portion of the Thames and also the five separate dock systems—that is the London and St. Katharine, the East & West India and Millwall, the Surrey Commercial, the Royal Victoria and Albert, and the Tilbury—were all under one control to be run for the benefit of the public and not in anyway for private gain. The purchase price of the various undertakings transferred to the Authority was about £23,000,000, and the necessary capital was obtained by the issue of Port of London Stock bearing fixed rates of interest. The Authority are self-supporting, and their revenue is derived solely

from dues and charges for the accommodation provided for vessels and goods, and the services rendered. It is their aim so to arrange their rates and charges as to reimburse as nearly as possible the expenditure they incur in carrying on their undertaking. Any balance is available for the benefit of the Port.

It is important to remember that the Port of London Authority are not merely a body that exercises statutory functions such as granting licences for certain purposes, making by-laws and regulations to control various matters, such as navigation; but they are, as regards their docks and warehouses, a body carrying on great commercial operations. Port Authorities in the United Kingdom differ considerably in regard to the work they carry out. Some merely provide dock, quay, transit, and warehousing facilities, and allow private commercial enterprise, subject to certain regulations, to carry on within the docks the operations connected with the handling of vessels and goods. When goods are landed on to the dock quays of London, the Authority take charge of them, either placing them on to railway trucks or road vehicles for immediate conveyance to their destination, or conveying them from the quays to one or other of their warehouses pending the receipt of delivery instructions from the merchants.

In addition to placing the goods into the warehouses and delivering them when required, the Authority perform many intricate and expert operations on behalf of the importers, such as reporting upon weight, quality, and condition; sorting the produce to quality and marks; opening packages for inspection and sampling, as well as furnishing samples to represent the exact condition of the produce. The extent of the work done by the Authority may be judged to some degree by the fact that their employees actually engaged in the various dock and warehousing operations number about 7,000, of whom 4,000 are of the class known as dock labourers. The total number of persons employed by the Authority in all branches of their work, including the administrative staff, is about 10,000. For the last financial year the total revenue of the Authority was £5,325,000, of which £4,364,000 was derived from the docks and warehouses.

There were certain duties that were not handed over to the Authority. The Corporation of London retained the sanitary supervision of the Port of London so far as shipping was concerned; the Corporation of Trinity House kept their powers of lighting and buoying of the river; and the Metropolitan Police their policing responsibilities on the river. It should be noted also that the quays, wharves, and warehouses belonging to the public wharfingers on the banks of the river remained independent undertakings carried on by private enterprise.

A special duty thrown upon the Authority was, to quote the words of the Act, " to take into consideration the state of the river and the accommodation and facilities afforded in the Port of London, and, subject to the provisions of this Act, to take such steps as they may consider necessary for the improvement thereof". The task which confronted the Port Authority was a formidable one, as can well be imagined. The Royal Commission had reported in 1902 that their inquiry into the conditions of the Port had convinced them of its splendid natural advantages ; among these were its geographical position ; the magnitude, wealth and energy of the population behind it ; the fine approach from the sea ; and river tides strong enough to transport traffic easily to all parts yet not so violent as to make navigation difficult. They added that the deficiencies of London as a port to which their attention had been called were not due to any physical circumstances, but to causes which might easily be removed by a better organization of administrative and financial powers. Here then, about seven years after those words were written, was actually realized the vision of the Commission of a better organization of administration and financial powers.

The welding into one whole of the various bodies taken over by the Port Authority was duly accomplished. It was inevitable that the internal organization of the Authority to cope with its work should be modified from time to time, and various experiments were tried before the present organization was evolved. This provides for a Board, the Members of which have the final voice. In the first instance, however, the consideration of all matters is delegated to various committees, whose proceedings are submitted to the Board for confirmation. Broadly speaking, the functions of the various committees are as follows :—

The General Purposes Committee consider all questions involving policy ; the construction of new works ; and all matters relating to the improvement of the river and the accommodation and facilities afforded in the Port of London.

The Dock and Warehouse Committee are concerned with the regulation and management of the Authority's docks and warehouses, and the dock dues and charges to be made on ships and goods.

The River Committee deal with the conservancy of the river ; the licensing of embankments, wharves, jetties and other accommodation in the river ; the regulation and control of navigation in the river ; the raising and removal of wrecks and obstructions to navigation ; surveying ; and river pollution.

The Finance Committee have under their charge the finances of the Authority; insurance matters; and all questions of rates and taxes.

The Staff Committee look after the general organization and provision of the staff, including permanent and casual labour; salaries, wages, allowances and superannuations; and claims under the Workmen's Compensation Acts.

The Stores Committee deal with the purchase, storage and distribution of materials, coal and other goods required in the working of the Authority's undertaking; the sale of old materials; and the purchase of supplies of gas, water, hydraulic power, and electricity.

The Law and Parliamentary Committee attend to the promotion of and opposition to Bills in Parliament affecting the interests of the Authority, and the conduct of legal proceedings.

The Maintenance Committee consider all questions affecting the ordinary maintenance of the property, plant, and machinery; repairs, renewals, alterations or additions in connection with the premises, plant, machinery or equipment; and the dredging of the river and docks.

The nature of the duties of the Executive Head of each Department will be appreciated by his title. There are a Solicitor and Secretary, a Chief Engineer, a Chief Accountant, a Dock and Traffic Manager, a River Superintendent and Chief Harbour Master, a Treasurer, a Chief Police Officer, an Establishment Officer, a Stores Officer, and a Publicity Officer. In addition there is a General Manager, who is responsible for the co-ordination of all the activities of the Authority.

I would like to say a word with regard to what has been accomplished by the Port Authority in the way of physical improvements. The bad condition of the river had been one of the complaints made before the Royal Commission, it having been stated that the depth was insufficient for the growing size of modern vessels. This was so impressed upon Parliament that in the Act the special stipulation was made that the Authority should form and maintain a channel between the Nore and Gravesend of a depth of not less than 30 feet at low water of ordinary spring tides, and not less than 1,000 feet wide throughout. In 1909 the ruling depth between those two points was 25 feet, and the deepest draughted vessel that had used the Port up to that time drew 27 feet of water.[1] This task of deepening the river by dredging

[1] The range of tide—that is, the difference between high and low water—in the Thames is as much as 21 feet.

was at once taken up, and the obligation laid upon the Authority by Parliament in this respect has long been discharged. There is now a good navigable channel 1,000 feet wide, with a general depth of 30 feet at mean low water, from the Nore not only to Gravesend, but to Cold Harbour Point, at Rainham, 10 miles further up the river, the total distance being about 35 miles. From that point to the Royal Albert Dock, a distance of six miles, the channel is 27 feet deep and 600 feet wide. Then for over four miles, as far as the entrance to the West India Dock, the depth is 20 feet, with a width of 600 feet. Above that place the channel continues sufficiently deep and wide to enable fairly large sea-going steamers to ascend to the Pool of London. Vessels which draw up to 37 feet of water, the normal draught of the largest vessels in the world, now use the Port. The task of dredging the river has involved the raising and removal of 53,000,000 tons of material at a cost of over £3,000,000.

Important as was the necessity for improving the river channel, it was equally important that the condition of the various docks and warehouses should be brought up to date. As soon as possible after the formation of the Authority a comprehensive programme of works and improvements to the dock systems was embarked upon. I do not propose to describe these works in detail. A separate lecture could well be devoted to such works and the engineering side of the Authority's activities. I will, however, broadly outline what has been done at each group of docks.

At the London Docks the works included a double-story shed and the widening of the quay on the North side of the Western Dock; the rebuilding of the Tobacco Dock passages; the construction of a ferro-concrete jetty with double-story transit sheds in the Western Dock; and a pumping installation to increase the water level and maintain it at a constant height.

At the India and Millwall Docks the improvements embraced an extension of the dry dock; the construction of several transit sheds; the widening of various quays; the making of ship-passages to connect the various docks; and a new entrance lock to replace the old South-West India Entrance.

At the system of docks commonly known as the Royal group an entirely new dock—called the King George V. Dock, with a graving dock connected with it, was constructed to the South of the Royal Albert Dock, while all the docks in the group were improved by the provision of additional cold stores, tobacco warehouses, new berths, and a pumping

station for raising the level of the water so as to give an increased depth of 2½ feet.

The Tilbury Docks were also extended, new transit sheds provided, a new entrance lock constructed and a new graving dock built.

The Surrey Commercial Docks were provided with extensive new sheds for timber storage, with new berths, and with new docks on the site of old and shallow timber ponds.

In addition to all these works, a cargo jetty was built and a floating passenger landing stage was provided, both in the vicinity of Tilbury Docks. Apart from all these improvements, a vast amount of other work of an important character has been carried out by the Authority in the way of bringing their dock undertaking and equipment up to the standard of modern requirements.

The Royal Commission spoke of the considerable outlay of money that, in their opinion, would be necessary to remedy the shortcomings of the past in the Port, and the truth of their remark will be realized when the amount of the Authority's expenditure is noted. The sum spent by the Authority on capital account has been £14,867,000, while £5,530,000 have been expended, in addition, on various improvement works.

It is difficult to give an adequate impression of the difference between the docks and warehouses as they exist to-day under the Port Authority and as they were twenty-five and three-quarter years ago, when the Authority took them over. Some idea may be gained by contrasting the previous and present dimensions of the quays, although that will not convey a complete picture, as many of the works did not add to dimensions but vastly improved and rendered useful for present-day purposes accommodation that had become antiquated. The total lineal quayage of the docks and basins was 41¾ miles in 1909; now it is 45¼ miles, and six miles of reconstructed quays have been brought into really effective use. The capacity of the docks for the accommodation of shipping has been increased by 60 per cent. The total area of the Authority's estate is now 4,247 acres compared with 2,700 acres twenty-five years ago. At the beginning of that period the largest entrance lock was 695 feet long, 79½ feet wide and 38 feet deep; at the present time the largest lock (at Tilbury) is 1,000 feet by 110 feet by 45½ feet.

What of the trade which passes through this great Port of London and for which all this expenditure of money and energy has been made? And what part does the Port play in supplying the country with the vital commodities for its existence? For centuries London has been

the principal port in the British Isles ; its trade attained relatively great dimensions even in early times, but at no other period in its long history did its business approach to anything like the volume it has attained during the past quarter of a century under the sway of the Port Authority. I think it is safe to say that the present volume of its trade could not have been accommodated if some such body as the Port of London Authority had not been formed to cope with the situation. This clearly justifies the act of the legislature in constituting the Authority.

It is interesting to note that in the year 1700 the volume of shipping that used the Port was 651,529 net regd. tons. Towards the end of the XVIIIth century it had increased to about 3,273,000 ; at the end of the XIXth century to nearly 34,000,000 tons, and in 1909, the first year the Authority took office, it amounted to 38,510,989 net regd. tons, that being 12.9 per cent of the total for the whole country. The latest information that is available in regard to shipping relates to the year ended 31st March, 1934, and it shows that the total reached was 57,470,156 net regd. tons, which is 16.9 per cent of the total for the United Kingdom. This figure is equal to the combined shipping tonnages of the next two most important ports of the country.

The total weight of goods imported into and exported from the Port of London, foreign and coastwise, including transhipments, last year amounted to 36,768,618 tons, and this was the highest figure ever recorded in the history of the Port, notwithstanding the fact that the trade of the country in common with that of all the other maritime nations of the world was suffering from the effects of tariffs, quotas, and exchange restrictions. The figure just mentioned is made up of the following, viz. :—

	Tons.
Overseas imports	16,018,914
Overseas exports	2,800,414
Coasting trade	14,861,500
Transhipments	3,087,790
	36,768,618

Particulars are not available as to the value of the merchandise imported and exported through London from and to coasting ports, but the Board of Trade publish information in regard to the overseas trade. The latest returns are for the year ended 31st December, 1933, and show that in terms of value London dealt with 37.2 per cent of the trade of the whole country, made up of 42.4 per cent of the imports,

25.1 per cent of the exports, and 56.6 per cent of the re-export and entrepôt trade.

Last year the value of London's overseas trade exceeded the total of the next four most important ports of the country.

As to the part the Port of London plays in supplying the country with vital commodities, it will be well to examine some of those commodities. Naturally one thinks first of the food required by the huge population of Great Britain: it is estimated that the value of home-produced foodstuffs is less than two-fifths of our total supplies—the actual figure being 38.4 per cent, and last year nearly 19,000,000 tons of imported foods were consumed in the country, over one-third of which passed through the Port of London. These figures are exclusive of the produce which is brought to our ports from overseas and is afterwards re-exported.

Grain, which is one of the most important articles of food, was once exported from this country, but it is now one of our principal imports. London deals with about 3,000,000 tons of grain, flour, rice, and seeds every year, this being about one-quarter of the country's total imports. As regards wheat alone, the total home production is 1,672,000 tons, and to make up the quantity required for consumption 5,635,000 tons have to be imported; 27.9 per cent of the imports comes through the Port of London. For the discharge of grain in bulk from ships the Port Authority maintain a fleet of floating pneumatic and bucket elevators having a total capacity of over 2,500 tons, and for the storage of the produce granaries are provided at the Millwall, Royal Victoria, and the Surrey Commercial Docks. The central granary at Millwall Dock is the largest warehouse for grain in London, and has a storage capacity of 24,000 tons. The principal milling centre of the Port of London is at the Royal Victoria Dock, where overseas vessels berth alongside the mills.

The home production of sugar last year was 463,000 tons, and the importations amounted to 2,377,000 tons, of which London dealt with 43.4 per cent. The Port Authority provide ample warehousing accommodation for this commodity, particularly at the West India Docks.

Green fruit to an extent of 520,000 tons is grown at home, and the imports amount to 1,649,000 tons, of which London deals with 38.5 per cent.

The average quantity of beef, mutton, and lamb eaten in this country is 95 lb. per head of the population per annum. The home production is 895,000 tons, and 966,000 tons are imported. London deals with

68.5 per cent of these imports. The great advance made in the science of refrigeration has rendered it possible to import such large quantities of meat. The space in the ships is refrigerated, and the warehouses in which the meat is stored are also refrigerated. The Port Authority have provided for both frozen meat—which comes chiefly from Australia and New Zealand, and chilled meat—which is imported principally from South America, facilities for the careful and expeditious handling of the produce on the quay and for the cold storage of such of it that requires to be warehoused.

Butter to the comparatively small extent of 45,900 tons is made in this country, and 403,000 tons are imported. Of the imported quantity 51.9 per cent comes to London.

Tea of course cannot be produced at home. The tea trade has been centred in London since tea was first brought into this country about three centuries ago. The annual importation into London now amounts to 535,000,000 lbs., which is 94.6 per cent of that of the whole country. A large proportion of the total imports is consumed in this country, but considerable quantities are sold on the London market for re-export abroad. The retained imports last year amounted to 218,000 tons, of which London dealt with 96.5 per cent. The Authority's warehouses used for the storage of tea are at Commercial Road and Cutler Street, in the City, and here such operations as " bulking " for mixing and blending, and sampling are carried out by the Authority's staff.

The quantity of tobacco produced in this country is negligible, but large quantities are imported from Empire and foreign countries, the figure for last year being 74,500 tons, of which London dealt with 36.1 per cent. The stocks in the Authority's warehouses at the present time amount to 45,000 tons, of a value, including Customs duty, of £60,000,000. The Authority's staff carry out a great many operations in connection with the casks and bales of tobacco after their arrival in the docks. These include weighing, sampling, and garbling, and the work has to be carefully performed by men of long experience.

One could mention a long list of other articles of food and drink dealt with in London ; for instance, wine, of which London deals with 70 per cent of the total for the United Kingdom. The wine vaults at the London Dock have been famous for over a century and a quarter. The rails in the gangways on which the casks are placed exceed 28 miles in length, and an even temperature of about 60° Fahr. is maintained in the vaults throughout the year.

Again, practically all the spices, such as pepper, cloves, cinnamon, nutmegs and mace, used in this country come to London, and the

London market governs prices all over the world. A great deal of the spices received here is re-exported, but the quantity consumed in the United Kingdom amounts to 7,350 tons, of which 93.9 per cent is imported into London. London Dock is an important warehousing centre for spices.

When we consider the raw materials required in this country for manufacturing purposes we find the same story. Wool has loomed large in London's trade for centuries. In the Middle Ages it was our greatest export; to-day it is one of our principal imports. More wool is brought into the Port of London than to any other port in Great Britain. It was through the agency of the London wool sales that the Australian trade was built up, and large quantities are received from the Commonwealth and from all the other wool-producing countries of the world, the total for last year being over 1,100,000 bales, weighing 180,000 tons. The quantity of imported wool and skins retained in this country for manufacturing is 346,000 tons per annum, of which London deals with 37 per cent. There is storage space in the London wool warehouses for 1,000,000 bales, and show space for 60,000 bales. The Authority's warehouses and show floors are at the London and St. Katharine Docks, where there is a staff of experts whose accuracy and impartiality in performing weighing and other operations required are implicitly relied upon by the trade.

The home production of wood and wood pulp is about 1,000,000 tons annually, and 8,171,000 tons are imported. About one-third of the imports comes to London, where practically a whole system of docks—the Surrey Commercial Docks, is required to accommodate it.

Rubber, another vital commodity in these days, must come from abroad, the total retained imports last year amounting to 43,500 tons, of which London accounted for 56.9 per cent.

What, it may be asked, is the cause of London's great import trade, and why should it be necessary or desirable to concentrate in one port such enormous quantities of shipping and goods? It is not a very difficult matter to provide the answer. Within twenty-five miles of the docks of the Port of London there is a population of nearly 9,500,000 people, in addition to a large floating population of business men and tourists. Within a hundred miles of the docks there is a population of more than 16,000,000. The Port exists to supply the population at its door. London therefore absorbs a large proportion of the foodstuffs and materials that pour into the Port. A great deal more enters the Port, however, than is required by the immediate market at its door, and one of the factors that has made London so great is that it is a great

international market, the financial centre of the world, and an enormous distributing centre for the United Kingdom as well as for many other parts of the world. There has been in recent years in London and its vicinity a great deal of industrial development. From figures relating to employment, etc., it seems clear that the growth of industry in the South near London has not been accompanied by anything like a similar expansion in the older industrial areas. This has been due to several causes; but that is another story. We are faced with the facts as they are, and it only remains for the Port Authority to cope with the situation as it is. It is their duty to foster the trade of the Port by improving and extending the facilities required. They cannot create trade, but they can facilitate and encourage it. That the Port of London Authority have rendered a good account of their stewardship for the first twenty-five years of their life is, I think, recognized. It is to be hoped that they will continue to justify their existence for years to come.

DISCUSSION.

LIEUT.-COLONEL E. FF. W. LASCELLES: I speak in a dual capacity; firstly as a New Zealander. The bulk of the commodities from that Dominion—one of the largest dairy and meat producing countries in the world, comes into London, and our exporters have complained of the handling of their commodities here. I should like to hear Sir David Owen's opinion on that point.

Secondly, I speak as an officer of the London, Midland and Scottish Railway. I have been asked by my colleague, the District Goods Manager of the L.M.S. Railway in London, to pay a tribute on his behalf to the efficiency of the Authority in handling the merchandise which comes through the Port. We realize, from a railway point of view, the enormous magnitude of their task.

There is a further matter which occurs to me as an ex-soldier. It has been ably illustrated by the Lecturer how dependent this country is on the Port of London for its raw materials and for its food supplies. But are we satisfied that we can depend, in time of war, on the Port of London and other East Coast ports to the extent that we undoubtedly do in peace? If supplies through these ports are interfered with, the railways may have the duty imposed on them of supplying the country with food and raw materials for munitions of war from other ports. How are they going to do it, even if they are supplemented by a highly efficient system of road transport?

THE LECTURER: With regard to the question of perishable commodities from New Zealand, I am not aware of any commodity that is handled with any less care in the Port of London than that given at the ports from which the goods are exported. The Authority have for many years paid special attention to this problem, and large sums have been spent on various mechanical appliances in order that perishable and other goods may be handled efficiently and expeditiously. Special berths have been provided to deal with frozen and chilled meat, and mechanical appliances such as conveyors, runways and electric trucks have been installed to deal with other perishable foodstuffs.

The war-time problem mentioned by the last speaker cannot be dealt with in a few words. It should be borne in mind, however, that war is the exception, and that it is impossible to organize the vital peace-time activities of the country to cope with something that is unknown. Trade will flow through the economic channels, and the defence arrangements should be designed to meet the situation as it exists.

CAPTAIN A. R. SMITHWICK, R.N.: The Lecturer has told us of the increase in the trade of the Port of London, and I gather that it is likely to go on increasing. It seems to me that congestion may very shortly arise in the Port of London. Are the Authority considering any method of increasing the facilities of other ports close by—for instance, Harwich and the Medway, in order to alleviate congestion? I would also like to know whether a week of fogs, such as we have just had, causes grave difficulties.

THE LECTURER: In regard to the matter of congestion, it is questionable whether, in view of the tendency shown in many parts of the world towards nationalistic self-containment, the overseas trade of the country will increase in the future in anything like the same ratio as in the past. If, however, the trade does increase and it is found that the economic channel is through London, the traffic will come to that port and not to some other. If the existing accommodation for shipping and merchandise is then found to be inadequate, the Authority would have to provide additional facilities.

CAPTAIN SMITHWICK: Is that possible?

THE LECTURER: The existing accommodation probably provides a margin over the present volume of shipping traffic of something like 25 per cent, although this is subject to various factors such as for example the size and draught of the vessels employed in the trade. As a matter of fact, the Authority have just decided to embark upon a scheme to provide additional deep-water accommodation in the docks, and there is ample scope for further development if required in the future.

As to fog—I can only say that that is a problem common to all the ports of the country, and I do not think that London is any worse than anywhere else. We must look to scientists to find a means of seeing through fog.

THE CHAIRMAN:

I was for three years a Member of the Port of London Authority, and nothing caused me more regret than when I had to give up the appointment.

With regard to Colonel Lascelles' last question—that is one of the highest importance. You may be quite sure it is a matter which is fully and freely discussed and considered—at least, I hope so—by the Departments on each side of this hall and across the road.

Nothing is more delightful and interesting than a visit to the Port of London Docks, and I would advise everyone to take a trip and see all the commodities there; for instance, the mammoth tusks of ivory from the North of Siberia, which may have been in the ice for thousands of years; the spices of Arabia, or the wood unloading in the Surrey Commercial Dock; to study the delightful names, such as the Quebec Pool and the Lavender Pool.

The increasing draught of ships and the possibility of their coming into the Port of London was mentioned. Not long ago the question arose as to what depth of

water there was to be over the tunnel which is to go from Gravesend to the other side of the river. At the time I was a member of the Board, and, as it had been suggested that we would have to arrange for a draught of water of ships of at least 55 feet, I sent for charts of all the big harbours in the world. I found it would be quite impossible for any ship drawing more than about 40 feet to get into the harbours of New York, the Thames, and various other ports on account of the approaches; so we are not going to have ships of such tremendous draught as that.

As a further example of the responsibilities of the Authority I may mention that when the new Waterloo Bridge was to be built they had to be consulted, because it is their business to safeguard the river and to see that a bridge is not put up which would endanger the proper movement of transport on the river.

Perhaps you noticed the picture of the ship in dock with hardly a shore on her? It was years before it was found that it is quite unnecessary to have shores, tier upon tier, almost every foot, and that all that is required is enough to keep the ship in place.

We have heard something of the history of the Port of London. One little story always interests me: as you go down Leadenhall Street you come across Philpot Lane. Sir John Philpot was at one time Lord Mayor of London. During that time a pirate named Mercer came to the mouth of the river, attacked the shipping there, and threatened to come and take the town. Sir John Philpot manned some ships, went down the river, captured Mercer's vessels and brought him back a prisoner to London. Perhaps government departments were much the same then as now: soon after Sir John received a letter asking him by what right he had made war on people who were not officially the King's enemies without first asking the King's permission!

The customary votes of thanks to the Lecturer and Chairman were carried by acclamation.

THE ROYAL AIR FORCE TRAINING YEAR AT HOME

By Wing Commander L. L. MacLean, *p.s.a.*, R.A.F.

On Wednesday, 21st November, 1934.

Air Chief Marshal Sir Edward L. Ellington, K.C.B., C.M.G., C.B.E., in the Chair.

The Chairman, in introducing the Lecturer, said Wing Commander MacLean was a member of the Staff of the Air Defences of Great Britain. The Air Defences of Great Britain comprised rather more than half the Service squadrons of the Air Force. Therefore the Lecturer's opportunities of observing the training were unrivalled.

LECTURE.

A COMPLETE review of the Royal Air Force Training Year would have to cover the whole range of training by land and sea, and by day and night: it would have to include the intricacies of the work of the Coastal Area, and of the Fleet Air Arm with the Navy; the different but equally complex duties of Army Co-operation; and lastly the multi-faceted problem of Home Defence. No one individual, normally endowed, could justifiably be regarded as an expert on every aspect of a subject with such wide scope, much less could he be expected to deal with it within the limitations of a single lecture. I propose, therefore, to confine my remarks to that aspect of Air Force training of which I have practical experience and actual knowledge—that is, the work of the squadrons during the training year in the Air Defence of Great Britain Command.

FUNDAMENTAL CONSIDERATIONS.

The Royal Air Force differs in so many fundamentally important particulars from both the Navy and the Army that it is quite impossible to employ a common measure for our aims, standards, and processes. Therefore, before examining any of the details of our training, I want to devote some time to preparing the picture so that we may view it from something of the same angle.

Man has moved and fought, on land and water, since his history first began; armies and navies have arrived at their organizations,

policies, and doctrines—each according to its own particular requirements—by a gradual process of evolution guided by a wealth of historical precedents. But man's experience of the air as a medium of movement is limited to some twenty-five years, and as a medium in which to fight, to some fifty months. It is just the fact that the whole development of practical flying has taken place within the memory, and under the eyes, of all the older members of the Air Force, and that collectively there is tucked away in their heads the entire history of fighting in the air, that makes for a fundamental difference between our way of tackling the problems before us and that of the other two Services.

Soldiers and sailors learn their profession by studying history, and their knowledge is founded and built on books and topped by experience. We in the Air Force have no historical literature to serve as a common denominator from which we can start from one common base to think along the same lines towards one common doctrine. Each of us tends to make his own decisions in the light of his own personal experience, and I suggest that, as a Service, we deal with our problems subjectively, while the Army and Navy deal with theirs, in the main, objectively. I think, therefore, that fundamentally we are far more inclined to be individualistic in our outlook than either of the other Services, and this individualistic element is very apparent throughout all our work, and by the very nature of our work must always remain so.

In discussing training to-day, I shall be talking only of the training of the flying personnel, that is, about 15 per cent of the strength of the Royal Air Force. Here we get the first glimpse of the striking differences between ourselves and the other two Services. In a naval battle the whole ship's company fights as one unit. Similarly in a battle on land, the unit, be it battery, battalion, or brigade, goes into the battle as a whole. With us the fighting element, somewhere about 15 per cent [1] of the squadron strength, is composed for the most part of officers.

In the Navy and in the Army the function of the officer is, in peace, to train his men to handle their weapons, and in war, to provide that control and direction that will ensure the most effective use of those weapons. In peace, therefore, the training of the officers is inextricably bound up with that of the other ranks, and in war they work shoulder to shoulder with the men, taking the same risks, bearing the same hardships, and exposed to the same emotional strains. In the Royal Air Force it is the officer himself who is trained to use weapons; and in war he personally uses them, while his men are there to keep the weapons

[1] About 80 per cent. of our pilots are officers.

in good order and maintain the fighting element in fighting trim. The function of the men is in fact far more akin, in boxing parlance, to that of seconds outside the ring than to that of combatants. This tends to place our officers and men on a somewhat different footing to that of officer and man in the other two Services, and creates an entirely different conception of training, particularly in so far as the officer is concerned.

A soldier for instance, be he officer or man, starts his career in a class or squad in company with others, and he never becomes a separate entity. Even in his embryonic stage he is part of a section or company, always working in co-operation with some other section or company, be it Lewis-gun section, machine-gun section, anti-tank gun section, or mortar section—all within one battalion; the battalion in its turn works with other battalions, and they work with artillery, cavalry, tanks, aeroplanes, and so on; each is dependent on the other; each is complementary to the other. The soldier's training from start to finish is *in essence* collective. Similarly in war he fights as part of the line; he shoots in support of someone else advancing; or when he himself advances, it is under the covering fire of others. He is conscious all the time of being dependent, or of having someone dependent on him; of acting under guidance, or actively guiding.

In no single respect is there similarity in the Royal Air Force. At his Training Establishment the pilot under instruction is, at first, almost akin to a specimen under microscopic examination. Every trait of character, and any idiosyncrasy is noted, analysed, and considered in relation to its probable effect on the ability to fly. When he leaves his flying training establishment and reaches his squadron, his training continues to be mainly individualistic. It is in this respect, as I see it, that the Royal Air Force differs absolutely from the other two Services. By the very nature of our work we must depend on the individual, on his skill and his fitness; and, in consequence, the aim of practically all our training is the development and enhancement of personal skill.

We do in fact label certain periods of our training "collective," such as the flight and squadron training periods, but they are not "collective" in the sense that the Army, for instance, would understand "collective training."

The other two Services think of men in terms of groups and masses. They are concerned primarily with mass psychology, while we are concerned primarily with the psychology of the individual, and only incidentally with the psychology of the crowd. In the Navy and in the Army it is the behaviour of groups of men under stress that is the main object of study: the susceptibility of the crowd to suggestions, its

impulse to follow a leader, and so on : hence the graduated command, the chain of responsibility, incessant supervision, and the importance of trained leaders. In the Royal Air Force, I do not think any of the training is specifically designed to inculcate and develop those qualities and characteristics that make for leadership, and in this respect our demands on the individual differ from those of, say, the Army. For the first few years we require very little of the young officer as a leader : he is essentially one of the led. Subsequently we seek to secure the natural leader by selective promotion. But what the qualities are which make for leadership I should hesitate to say. An infantry commander may be a bad rifle shot, an indifferent horseman, a martyr to flat feet, and yet possess all those qualities that make for a superlative battalion commander. I doubt if the same would apply to a squadron commander in the Royal Air Force. He could not be a bad pilot, a poor shot, or an indifferent bomb-aimer and still be able to inspire in those working under him that confidence which is vitally necessary if a squadron is to be maintained at a high pitch of efficiency ; nor, in fact, would he be able to supervise that practical instruction which to a large extent devolves on the squadron commander personally. Practical example in the air is more convincing than the most persuasive and fluent talk on the ground ; while personal skill, both in flying and in handling weapons, exerts great influence.

Administratively we have the same graduated command and chain of responsibility as in the Army. But in war, the pilot goes out dependent on his own resources, and secure only in his own skill ; and even when working in close formation he has not that same comfort as the infantryman of having a near neighbour to whom he can talk, and the consciousness that, if he is in dire need, there is someone there to give him a hand, and someone expecting a hand from him.

From the training point of view, we cannot afford to lose sight of the individual when thinking of the formation. Fighter attacks aim at breaking up the bomber formation ; then, having resolved it into its individual parts, the fighters seek to destroy the separate bombers piecemeal. The day bomber, therefore, must be prepared to fight alone. Employed, as he will be, on strategic reconnaissance, he must, moreover, be prepared to fly long distances alone ; and as our aim is to operate anywhere, at any time, and in any weather, we must be prepared for formations to lose cohesion in fog or cloud, and to continue as single aircraft. The night fighter and bomber must always be prepared to work alone. Pilots, therefore, will go out in the belief that, sooner or later, the fight will ultimately resolve itself into a personal combat in which individual speed and skill alone will count : combat in which

there are only two sorts, the quick and the dead. That, I am convinced, will be the thought-process of every pilot—be he fighter, day bomber or night bomber—if not in peace, then as soon as he has faced fire. The fighter pilot of to-day may become the day or night bomber pilot of to-morrow ; it does not matter what he is, sooner or later, whatever his employment, he will have to work alone and he will become the individualist.

What peculiar motive are we going to depend on to drive the night bomber, a solitary machine, across half a continent, through a dirty night of cloud and rain, seeing nothing but impenetrable darkness, relieved perhaps by an occasional light just sufficient to give a fleeting drift reading, expecting attack on most of his flight to a hotly defended objective, say, 500 miles away, and certain of attack on his way back. There is no question of leadership in it ; so the impulse to go and the will to arrive must flame within each individual member of the crew and continue burning, despite cold, discomfort, and that insidious onset of fatigue which is the inevitable concomitant of night flying. Whatever the motive, be it the highest ideal of patriotism or *esprit de corps*, the red-hot urge for reprisal, or the baser competitive desire to go one better than one's neighbour, it will not stand the prolonged strains that must be faced on such flights if there is any hint of lack of confidence by any member of the crew, in himself, his comrades or his equipment. In every branch of our duties the secret of good work in the air is a well-founded confidence of the individual in his own personal skill and the superiority of his equipment : the pilot, confident that he and his aircraft can outfly anything they are likely to encounter ; the navigator, certain of his own powers to make and recognize a landfall at the time he expects to make it ; the bomb-aimer, sure of his bombsight and his ability to use it ; and finally the gunner, perfectly at home with his gun. Confidence is mainly the consciousness of past success : it is born out of achievement by constant practice. The first requirement, and the foundation of all our work, is flying skill. The ability to get the most out of a machine in the air, and the ability to put it down, if things go wrong, into a small space.

FLYING SKILL.

No two people will agree on what flying is, what characteristics it requires, or what demands it makes on the pilot. Many will say that anyone can fly, and when one hears of a youngster of twenty-two, with only a few months' flying experience, flying in record time between England and Australia, one wonders if there is not something in that belief. But the next day one hears of a couple of crashes for no obvious reason by skilled pilots with years of experience behind them, and

one inclines to swing to the other extreme—that of those who say " God never meant men to fly."

For my present purpose I offer a formula which may, for the time being at any rate, serve to bring us all into the same line of thought. In the words of Sir Henry Head : " Flying is an extended application of the power of the human race to use tools and demanding adapted movements of the body and limbs. Flying, like the ability to play games, is acquired by practice, and eventually becomes semi-automatic, but anything which depresses the higher controlling centres over the lower activities tends to cause a loss of the perfect co-ordination previously acquired, and the pilot regresses to the early stages of his flying —the pre-automatic stage—and makes mistakes and errors in flying."

It is a simple simile, this comparison of flying to games, and I think the analogy runs fairly true all the way along. In all games there is a common standard that the average, fit, athletic being who plays games reaches ; a few exceptions tower above that standard. I think it is the same in flying ; there is a sort of average degree of skill within certain fairly elastic limits, while the so-called star, the natural pilot, stands out from the crowd. In flying, as in games, physical fitness is all-important ; a man can go off his flying just as he can go off his game, and his skill will similarly deteriorate under the influence of fatigue. But there is always just this difference between flying and games. At games the opponent is human, and the stakes trivial. An error of judgment at golf may cause the loss of a hole, or at cricket, a wicket ; but in flying the pilot is pitting himself against all the infinitely variable forces of Nature, and the penalty for an error of judgment, or a split second's inattention, may be the loss of the aircraft and crew.

On economic grounds alone, as a Service, we cannot afford to have errors of judgment in flying, and as the cost of aircraft increases from hundreds to thousands of pounds we can afford it less and less. Therefore the basic underlying design of all training must be to reduce to a minimum the probability of human error. The individual must maintain his flying skill up to that pitch at which he acts intuitively, automatically, in any emergency. This is tantamount to saying that the more hours a pilot spends in the air the more efficient he will be, but hours in the air can be completely wasted, and even be harmful, if the principal object of each pilot's particular training is not always kept strictly in view. For instance, the object of every bomber pilot's training is to enable him to make his way correctly from point to point and drop bombs accurately. The first essential of both navigation and bombing is the ability to fly on an undeviating course at a constant

air speed. All hours spent in the air in acquiring this particular skill are productive hours; while hours spent in the air which may tend towards slack, slipshod flying are wasted, if not actually deteriorative. In this last category I must place much of the flying that is done for the purpose of providing targets for training artillery, searchlights, sound locators, and observer posts. On such duties the pilot has a fixed task, flying to and fro on a roughly predetermined course for a specified time. All the circumstances conspire to boredom, which is synonymous with slackness, and it is very hard to devise any sort of antidote. I would even go so far as to classify much of the flying that is done in conjunction with Army manœuvres by bomber and fighter squadrons as unproductive from our point of view.

In the Air Defence of Great Britain Command last year about 4 per cent. of the flying was on duties of this nature. At first sight it seems a negligible proportion, and I am not suggesting for one second that, looked at in its broad aspect, such flying is wasted. We realize fully the supreme importance of it all, but as a Service, in which our hours in the air are for various reasons very limited, every hour that is not in some way enhancing the skill of the pilot is detracting from our efficiency as a fighting force.

I have just said that on economic grounds we could not afford to have accidents through human errors; even less can we afford to have them through mechanical failures. A mechanical failure is two-fold in its effect, because, besides causing direct loss, it may have the far further reaching result of undermining confidence in equipment, and I suggest that, as a Service, we are far more susceptible than either of the other two Services to the demoralizing influence of suspect equipment. The thoughtless are rather apt to chafe under the strict and meticulous thoroughness of the maintenance system that covers all our equipment, and to complain that flying hours are unduly curtailed thereby. The answer lies in the progressive decrease annually, per hours flown, of forced landings due to mechanical failures. The consequence is that young pilots nowadays feel most aggrieved if they are forced to land through any engine trouble. I can look back to the time when I had seven forced landings in one day, of which five were engine failures.

There is no gainsaying, however, that maintenance does impose some restriction on flying. Inspections are systematic and frequent. I do not propose to enter into details; but as an example I will just mention that some portion of the airframe is examined every day, or else before every flight. A certain percentage inspection on each

occasion ensures that the whole external inspection of the airframe is completed about once every six weeks.

Similarly the engines are inspected before each flight, and every group of parts, such as the petrol system, oil filters, plugs, ignition system, water system, complete oil system and cylinders, are subjected to a critical examination after every so-many-hours flying, according to the make and type of engine. The aircraft is placed unserviceable until the work of each inspection is completed, entered up on the maintenance sheets by the working fitter or rigger, and signed as correct by the supervising authority—it may be the Flight Sergeant, it may be the Flight Commander. This system is extended to cover all equipment, and the period of inspection is statistically based on the time factor of past failures.

A Service pilot in a bomber squadron averages perhaps 150 hours flying in a year. A civil airways pilot, in constant employment, reaches a figure somewhere between 800 and 1,200 hours. A Service pilot may have to fly anywhere in the world. The civil pilot works almost exclusively on one air route. Accordingly I will not labour the absolute necessity for filling every minute of that 150 hours or so with " sixty seconds worth of distance run "—it is obvious.

In a twin-engine night bomber squadron I found that the bare minimum in which one could train a good average first-year pilot in the rudiments of long-distance night bombing was 95 to 100 hours' flying, made up as follows :—

(*a*) Instruction on twin-engine aircraft and in night flying and landings ;

(*b*) Nineteen practices and tests in navigation, all under the supervision of an instructor ;

(*c*) Twelve practices in finding " Wind," " Speed," and " Direction " flying over the camera obscura and bombing, similarly under supervision.

(*d*) Various practices in air gunnery.

In addition to this, some 40 hours is normal flying time on the air gunnery and bombing ranges at an armament training camp.

It is only too easily demonstrable that 150 hours are very easily absorbed in basic training in flying, navigation, bombing, and gunnery ; and that every hour spent in extraneous work is at the cost of precious training time.

SPECIALIZED TRAINING.

The whole of the work of the Air Defence of Great Britain Commands is, like Gaul, divided into three parts—the work of the fighters, the work

of the day bombers and the work of the night bombers; and while I do not suggest that there is not a vast difference between the duties of a fighting and a bombing area, I propose to deal mainly with the bombing side of our work, chiefly because I know more about it, but also because, if I can cover that part thoroughly, my remarks will be equally applicable, if modified in some directions and amplified in others, to the training of the fighter.

The duty of a bomber in war is to reach its objective and drop its bombs accurately on its target. That simple enunciation presupposes that the crew of the aircraft know how to fly, can defend themselves if attacked in the air, can navigate themselves from base to objective and back, and bomb their targets accurately when they reach them. Basic training therefore consists of flying, navigation, air gunnery, and bombing: each of these in turn is expanded into its more elaborate forms—flying, for instance, into twin-engine flying, night flying, formation flying, formation flying at night, and blind flying; bombing into high-altitude level bombing, diving bombing, and so on.

Let us first trace the dependence of all subsequent training on the basic ability to fly accurately. A young pilot commences his career by going through a course of training at a flying training establishment, during which time he completes, all told, about 100 to 150 hours' flying. On leaving he can handle a moderately fast single-engined machine, has an elementary idea of air pilotage, and has done some ground training with aerial guns. On this foundation there is a good deal of further training to be built, and it falls to the Service squadron to continue this training, according to the squadron, the nature of its work and the particular type of aircraft with which it is equipped. This advanced training in flying is no negligible item in the annual training programme of the Service squadron, and falls particularly heavily on the twin-engine night-flying squadrons. It will become more of a problem still if night flying becomes universal and squadrons have to train as day-night bombers, and if speed and weight of aircraft generally increase.

The formula I gave for flying was " an extended application of the power of the human race to use tools, demanding adapted movements of the body and limbs." I will not dwell on the difference of technique required in making use of different tools, and the analogy of flying dissimilar types of aircraft as, for instance, the " Hart " and the " Hendon "–I quote these two because their speeds are not dissimilar and I know both–but it is important to understand that there is an appreciable difference in the technique of flying these two types, and when we get aircraft of the size of the " Hendon," or still larger, capable of speeds up to 250 m.p.h., the difference will be still more marked.

I do not suggest that the pilot competent to fly the " Hart " type will not be able to fly the " Fairey " ; but I do mean that the average pilot, be he experienced or still in his novitiate, trained on, and accustomed to, single-engine aeroplanes, will always require an appreciable amount of further training before he reaches, on the heavy streamlined multi-engined aeroplane, that automatic state of precision at which the Service squadron must aim before it can afford to treat its pilots as Service pilots and trust them with crews. Superimpose, in addition, training in flying at night, or flying in clouds, and the Service squadron is saddled with a very heavy load of purely flying training before it can commence its more real work of navigation, air fighting, and bombing.

The whole elaborate structure of the various ramifications of advanced Service training is erected upon the basic training which is carried out at the flying training establishment, and is done in the period allowed for " individual training " in Service squadrons, i.e., between 1st October and 28th February : a period that is none too long for the work that has to be done. I used the word " ramifications " with intent, for it is only when the whole scope of training is analysed that it is possible to realize how closely interlocked the various apparently dissociated items are. For instance, the general use of close formation flying in fighters and bombers for tactical purposes imposes the necessity for a high standard of individual flying skill ; and it is a reasonable assumption that bombs dropped from a good formation would reach the ground in much the same pattern as the formation, and so, amongst other things, compensate for inherent inaccuracies in individual bombing.

BOMBING.

I will now for a moment touch upon the pure flying requirements for a bombing run. Briefly, they are simply that the bombing machine must be brought up on a straight run to the target before dropping the bomb, dead level, and at a fixed constant air speed. Let me demonstrate what that means.

If the aircraft is flown in an incorrect attitude, various errors are introduced in relation to its track across the ground, the path of the bomb, and the alignment of the bomb sight. At the moment I am concerned only with the effect of bad flying on the flight of the bomb, and not with the bomb sight. If the aircraft is flown one wing down—a common fault, the aeroplane tends to slip towards the drooping side and the resultant track is not true. The bomb follows the path of the false track. If the approach to the target is inaccurate, corrections will have to be made involving the use of the rudder. This swings the nose on to

the target, but the aeroplane tends to skid in the line of its original direction. If the bomb is released while the aircraft is skidding, the path of the bomb will be along the line of the skid. The same applies to longitudinal errors. If the nose of the aeroplane is allowed to go up, the aeroplane begins to lose speed and the bomb goes away with less than its correct velocity and falls short ; or on the other hand, if the nose has been allowed to fall, the aeroplane gains speed and the bomb falls away with more than its correct velocity and overshoots.

I mentioned earlier how much a pilot depended upon his eyes to maintain his attitude in space. Deprive him of his horizon by reducing visibility, and the accuracy of his flying at once falls off. This is where an automatic pilot has such a vast effect on bombing. Properly adjusted it maintains the aircraft in correct attitude, irrespective of visibility, and the bomb aimer can be sure of undeviating flight in any weather. When he is not provided with an automatic control, it is obvious that the pilot must be flying for an appreciable time on every run with every sense and nerve at its highest pitch of concentration, trying to anticipate every movement of his aircraft in space, and alert to change attitude instantaneously in response to the very inflection of voice of his bomb aimer. This automaton-like accuracy can only be acquired by constant practice, and requires definite physical and psychological characteristics which many otherwise good pilots do not necessarily possess.

Apply these requirements to the conditions in the formation as we actually see it. No two machines are on an even keel together at the same time, fore and aft or laterally, and there is always a slight closing or opening one way or another between aircraft, showing either variation in air speed, deviation from course, or side-slip ; and every pilot therefore, except possibly the formation leader, is committing every error that one would unhesitatingly condemn if he were doing an individual bombing run. Hence the dispersion of bombs and the necessity for a readjustment of ideas. The inference is that we must demand a yet higher degree of accuracy in formation flying than we have aimed at hitherto. That is, in effect, a demand for an improvement in individual flying skill.

I will add a reference to diving bombing. This is a method of attack that is still in the trial stage. The primary object in developing it is to have a form of effective attack that can be employed when weather or other conditions preclude attack by normal bombing methods. Secondarily, however, it is essentially a method of achieving surprise. The principle is simply that the attacking aircraft points its nose to the target and dives on to it, releasing its bombs from such altitude as will give the bomb no time to deviate from the line of flight before it hits its mark.

Principle, however, as in all forms of bombing, differs mightily from practical technique. The forces acting on the aircraft during its dive are the same forces that would be acting on a bomb if it had been dropped from a similar height as the dive. If any error has been made in the estimation of wind velocity and direction, or in anticipating the speed and direction of movement of a moving target, such as a ship, the aircraft on its dive will tend to be just as much off its mark as a bomb dropped from the same height as the commencement of the dive. The aeroplane, however, coming down under control can, within certain limits, be directed on to its mark, the governing factor being the relative correctness of the point in space at which the dive was commenced. In an attack of this nature, whose essence is opportunism, it is obvious that there can be but little stereotyped routine. Success must depend on the quickness of perception, sense of proportion, accuracy of judgment, and determination of the formation commander and his flight leaders, developed by constant practice.

Compare this with the process of calculated deliberation necessary in high-altitude bombing, when every conceivable factor is taken into consideration, computed, and reduced to a figure for the bomb-sight; and every bomb dropped is plotted, its position analysed, and treated as data for further calculations; all instruments being used and calculations being done in a cockpit whose front is open to accommodate the sight, and the occupant sitting in the resulting draught at an altitude, it may be, of 18,000 feet, with the temperature as low as minus 16° F. and a pressure of 500 millibars.

Cloud and Blind Flying.

Cloud flying in formation, which is a tactical requirement, also demands individual skill of a similar kind and degree, but under even more exacting conditions. Cloud flying is the practical application of blind flying, and demands not only the ability to fly by means of instruments, but the ability to maintain by means of those instruments that undeviating and steady course to which I have already referred, together with the skill and determination to maintain close formation in visibility reckoned almost in feet.

I approach the subject of blind flying with some diffidence, because my experience of it is limited, but I believe I am correct in my opinion that blind flying is something utterly different to normal flying. In normal flying one depends almost entirely for estimating attitude in space on one's eyes. Through the eyes the brain receives, almost instantaneously and simultaneously, warning of any change of attitude, direction, or velocity, and the reaction is automatic, rapid, and sub-

conscious. In blind flying the eyes convey no information except the separate readings from dials on the instrument board. These are appreciated by no means instantaneously. The time factor comprises the lag inherent in the instruments, the lag inevitable in trying to look at three instruments at once, and the time lapse while the mind is co-ordinating the two or three readings and interpreting the messages conveyed. The muscular response must be correspondingly delayed, and, as the mind will be dealing with perhaps three messages from three separate sources, concerning air speed, side-slip and turn, various physiological factors will intervene to make the speed of reaction vary within wide limits with different people.

As with bombing, so with cloud flying we are always experimenting ; but whereas with bombing one has concrete results by which to gauge progress, with such an innovation as cloud flying the personal factor, both as regards individual pilots and leaders plays so great a part, that any forecast as to ultimate result must be made and accepted with caution. The psychological factor is incalculable. A squadron, whose formations may make consistently excellent flights through clouds under training conditions, when the minimum cloud base is known to be 2,000 feet and the aerodrome at destination to be clear, may fail under the exacting tests of service conditions, when the unknown factors predominate, and clouds are low and give promise of being down to the ground *en route*, and there is no certainty that the aerodrome of destination will be clear.

Correlated with the psychological is the physiological. Blind flying, as I have already indicated, demands constant conscious effort as opposed to the unconscious or subconscious reactions of normal flying. Prolonged flying under blind conditions will therefore impose a very heavy fatigue factor, of which due account must be taken.

Cloud flying, above all things, demands confidence : confidence of the individual in himself, in his leaders, and in his equipment. This applies equally to flying by day or night ; more intensely perhaps at night, when the first warning of cloud occurs when one is in it, and flying becomes absolutely blind and dependent on instruments.

I have dwelt at some length on these two features of the annual training programme with a twofold object : firstly, to emphasize the particular nature of, and the necessity for, sound basic flying training ; and, secondly, to illustrate the percussions and repercussions throughout the whole fabric of the Air Force of a decision based on operational requirements. The general introduction of cloud flying means that every Service pilot will have to receive training in blind flying. This reacts on the training syllabus of the flying training establishments and,

further back still, on the syllabus of the Central Flying School. This School has to train and provide instructors for the flying training establishments before they in turn can commence to instruct the young pilots under training.

In the meantime, in order to continue the practical development of cloud flying and the investigation of such questions as ice accretion on aircraft, ice accretion on the bombs, and kindred problems, an organization has to be created temporarily within the Command, to subject a number of pilots already in Service squadrons in the Air Defence of Great Britain to the blind flying course, and to maintain in practice those pilots who have done their preliminary training in blind flying.

Specialized flying requires, of course, special equipment. Initial training is done on hooded "Moths" and "Avros," but it is not so easy to design hoods and attachments suitable for the fast and already heavily equipped Service aeroplane; and we are still in the process of evolving hoods suitable for use on Service types. The problem of maintaining pilots in blind flying practice is in itself no simple one. It is almost a commonly accepted belief that in England most days in the year will provide facilities for cloud flying. The reverse is, in fact, the case. There are comparatively few days which provide suitable types of cloud. Last year, for instance, not one of our squadrons completed the syllabus of training laid down for it. But even if suitable cloud were always available, its use would still be limited by the dictates of safety precautions. The aircraft of some twenty or thirty Royal Air Force squadrons and training establishments cannot be authorized to go into the air to indulge in cloud flying whenever they feel so inclined. The clouds have therefore had to be controlled and divided into cloud flying areas.

Equipment.

I have already referred to the loading of Service aircraft with equipment, and it is interesting to see how, piece by piece, special equipment is added in response to special requirements. Some exercises are carried out over the sea, hence the fitting of flotation gear, i.e. compressed air bottles and buoyancy bags—both bulky and weighty. All bombers being expected to work at high altitude, oxygen apparatus for the crew has also to be carried, and some aircraft require radio sets for communication purposes.

As our bomber squadrons are essentially general purpose squadrons, and may be called upon to carry out any form of bombing from high-altitude level bombing to low-altitude diving bombing, the preceding

items are included as standard equipment on all day bombers. Now, some difficulty is being experienced in installing the camera which normally accompanies all bombing formations.

I will not try to emphasize the complexity of the bomb sight. It is a straightforward instrument, but it requires accurate and precise handling and a good deal of " lore " apart from mere mechanical precision, and the slightest error means the waste of a run, possibly of a whole raid. One man alone operates it, and he operates it under conditions of the most intense discomfort.

Any bombing must be preceded by some method of wind finding. I do not propose to recount the various methods in use, but the following authoritative opinion is of interest :—" the determination of the direction of wind from aircraft will always remain an art which necessitates skill. Skill may be represented by a complex and costly instrument requiring little intelligence for its manipulation, or it may be possessed by an operator using relatively simple mechanisms, but skill there must be." The reference to a complex and costly instrument is not without its irony, when the conditions under which the instrument will have to be used are remembered. Even in using the existing bomb-sight one must have comparatively unencumbered hands and the utmost protection that can be employed is a pair of wash-leather gloves ; out of those I personally used to cut off the thumb and first two fingers of the right hand.

There is no short cut to bombing efficiency. Accuracy can only be obtained by constant practice in dropping bombs under conditions as similar as possible to those that will obtain in war. The secret of bombing is technique, and the technique varies with circumstances and with every different type of aeroplane. It varies by day, and it varies by night. The technique of bombing with an automatic pilot is absolutely different to the technique of bombing under manual control. There is no pilot's fatigue factor, no visibility factor, and no problem of co-operation between pilot and bomb-aimer once bombing has begun.

Looking ahead to the 200 m.p.h. bomber, I wonder whether we shall want an automatic control, or will the machine be sufficiently stable by virtue of its speed to dispense with any such thing ? But even if we fly on passage at 200–250 m.p.h., shall we be able to bomb accurately at that speed, or shall we have to throttle down to fly that same machine manually at, say, 120 m.p.h. ? If the fast big aeroplane does not require the automatic pilot, then flying skill for bombing will be even more important than it is now. It is obvious that any innovation that may be useful for one purpose, but which ultimately may tend

to interfere with the development of manual skill, must be most carefully watched as it is taken into use.

TRAINING PROGRAMMES

In evolving a training programme, it is such factors as the foregoing, and the special requirements of the Royal Air Force overseas, that one has to bear in mind. In the Army, battalions move as complete units and each battalion completes a specified tour abroad, changing its personnel so gradually that the change is almost unnoticed. Royal Air Force units, on the other hand, remain abroad permanently, but the personnel is continually changing, due to two main causes :—

(1) That, owing to our Short Service system, there are in our junior ranks three officers serving on a six-years commission basis to every two on a permanent basis ;

(2) The proportion of squadrons stationed abroad as compared with those stationed at home ; and the fact that the drafts for the units overseas are drawn from those at home.

We have five army co-operation squadrons at home and five abroad ; ten single-engine bomber squadrons at home and thirteen abroad ; five twin-engine bomber squadrons at home and two and a half abroad. Four flying-boat squadrons at home provide trained pilots for the two flying boat squadrons abroad. Finally there are thirteen fighter squadrons at home, but no fighter squadrons abroad.

The immediate effect of the continual passage of Short-Service officers, and the meagre strength at home from which we provide our commitments overseas, is that the average sojourn of a pilot in a bomber squadron at home may be something under eighteen months and that the squadron at home may lose at least half its personnel each year and have to start training afresh each training season. The annual training programme must in consequence be designed to produce a sufficiently polished article for direct absorption into the squadron overseas, be it bomber or army co-operation.

A number of circumstances cause the cycle of our training year to commence in October and end in the following September, two governing factors being :—

(1) In the winter months, flying, influenced by weather, must be somewhat irregular. The bad weather periods can be devoted to the ground training, which must precede and run parallel with all individual training in the air.

(2) The trooping season commences in September, and the incessant changes due to postings overseas, leave, and arrivals

from abroad, during the period September to February, would make flight and squadron training impossible.

These five months are therefore devoted to grounding the student in flying, air pilotage, gunnery, and individual bombing, according to the degree and nature of the particular type of squadron. During the next three months, March to May, individual training is expanded and applied to flight work, i.e., aircraft working in formations of three (it may be four).

In the four months, June to September, the syllabus is extended to practising the three flights in working together as a squadron. During this period the Command is exercised as a whole with a view to testing the efficiency of the squadrons for war.

I outlined earlier the ratio of time devoted in a twin-engine night-bomber squadron to the main branches of training. A similar principle holds good for day bombers, except that while night flying demands particular concentration on navigation, day flying demands a similar concentration on formation flying.

If the whole armament training of a squadron could be carried out in the vicinity of our aerodromes, one of the major difficulties of organizing training would disappear. There would be no disruption of squadron life, training would be far more progressive, and could culminate in a suitable crescendo in July and August when the supreme test of the Air Defence of Great Britain Command Exercise takes place. But high-altitude bombing and firing from aircraft at towed targets in the air obviously requires wide-open spaces and cannot be carried out on inland ranges. Squadrons have therefore to spend periods of from three to seven weeks at armament training camps in specially selected places on the coast to permit of this essential portion of their training being carried out. The opposition that we encounter in acquiring ranges on the sea for this essential training of our squadrons is almost unbelievable. At present there are in fact only three training camps, one for the fighter squadrons and two for the Regular and Special Reserve bomber squadrons, and these are available, as far as our Command is concerned, only from 1st May to the end of September—twenty weeks in all. Each camp can work two squadrons at a time. The creation of the training programme for the year hinges on fitting all the squadrons in the Command into these three training camps for the requisite period, while the remainder of the commitments are fitted in jig-saw fashion afterwards.

Such a major item as the Royal Air Force Display at Hendon adds to the complications. Some eleven squadrons take part and none of

these can go to camp until after the Display. The Air Defence Command Exercise cuts a clean week out of July.

Leave cannot be granted piecemeal to individuals without destroying the effective strength of the squadrons; consequently, as far as commitments permit, leave for the whole Command is concentrated into two months, August and September.

Once the various pieces are fitted into that jig-saw, it does not require very much imagination to picture the consternation that is caused by a casual demand for two day-bomber squadrons, a couple of night-bomber squadrons, and as many fighters as can be spared, to provide the realistic touch to a searchlight exercise, say, in Devon, or a combined operations exercise in Scotland.

It may seem that I have dwelt unduly on our difficulties, but in preparing any sort of syllabus of training one is mainly concerned with difficulties, and the actual syllabus shows how we overcome those difficulties. It may not be ideal in every respect; it is, in all probability, merely a series of compromises. Still the present system answers with the small force that we have. With an increased force and more material to work with, other methods may be justified or even required. When considering the future, one solution to many of our difficulties seems to present itself in, for want of a better word, " regimentation "—that is, specialization of squadrons within the Royal Air Force according to the nature of their duties. For instance, there might be a regiment of fighters, a regiment of day bombers, and so on. Sub-divisions of a regiment might then be made into groups of say, four squadrons, one training squadron, two Service squadrons at home, and one Service squadron abroad.

On our present strength any such organization would have been absurd. Will it become feasible under the lately announced project for expansion? If so, from the training aspect alone, it seems to merit consideration, while apart from training it will have many other advantages.

DISCUSSION.

AIR-MARSHAL SIR ROBERT BROOKE-POPHAM: I should like to stress the importance of maintaining skill in piloting. With all the many things we have to do in the Air Force, there is rather a danger that we may lose sight of the very important fact that everything finally depends on the ability of a pilot to handle his aeroplane. As the Lecturer showed, this applies not only to fighters, but to bombers. Carrying one's mind back to 1914, besides *esprit de corps*, what pulled the Army through in the early stages of the War was the fact that the infantry soldier was an absolute master of his weapon—the rifle. We must never forget that lesson as applied to the Air Force: everything is based, ultimately, upon the

ability of the pilot to handle his weapon—the aeroplane, under any conditions and with complete mastery and skill.

CAPTAIN E. ALTHAM, R.N.: The Lecturer mentioned the possibility of a regimentation system in the near future; would that be somewhat on the lines of the French *escadres* and *escadrilles*, which I believe now form part of their organization?

THE LECTURER: I am afraid I have not gone into the matter in such detail as that. I really only threw it out as a suggestion.

CAPTAIN ALTHAM: Perhaps I might invite attention to an article in the November (1934) number of the JOURNAL, dealing with the French Air Force, in which mention is made of the *escadres* and *escadrilles* systems.

THE CHAIRMAN.

We have had a very interesting and very thoughtful lecture. There are two aspects of training to which the Lecturer has not had time to refer. I would not like you to think that those two subjects have been neglected. One is air gunnery, and the other is navigation.

In the last few years the opportunities for practice in air gunnery have been considerably added to by increasing the opportunities for firing from the air at a target in the air. As you all realize, that means a very large danger area. We have had the greatest difficulty in the past in finding places on which to put practice camps, even with the comparatively small Air Force of the last ten or twelve years. With the increases which have now been sanctioned the difficulties of finding additional ranges are very great indeed; the greater part of the coast of England is taken up with places where fishing takes place, with ports, and with watering-places.

The other important thing is navigation. The Lecturer has mentioned cloud and blind flying. That has brought home to us the importance of navigation. In this country and in Europe periods of cloud are very considerable, and I think that in war-time, as the anti-aircraft defences (including the defences by fighters) become more efficient, there will be a tendency for bombers to take a route across the sea where they will not encounter defences; and in that connection navigation is of great importance. We have recently had an example of the necessity for good navigation in connection with the race to Melbourne. You remember that the winners, Scott and Black, made their first landing on the first stage at Kirkuk—a hundred miles away from Bagdad, their first destination. They deviated from their course to the left. Had they deviated to the right they would have found themselves in the desert to the West of the Euphrates, and the time taken to find them and to supply them with petrol would have cost them the race. You will also remember that the two Dutch pilots who flew the Douglas machine and were second in the race got through their flight without a hitch as long as they were on the route they knew, but as soon as they got to Australia, which they did not know, they went off their course and had the first hold-up in their flight.

The customary votes of thanks to the Lecturer and Chairman were carried by acclamation.

STRATEGIC MOVEMENT BY RAIL IN 1914

By Captain C. S. Napier, R.E.

" We must be careful to keep constant watch upon the progress of science and of scientific methods, for future wars may assume an aspect entirely different from that of the last war ; but from the latter let us learn the solid facts of experience, not with a view to complacent imitation, but as firm ground on which to base new methods of waging war."—General Ragueneau, Director of the French Railways during the greater part of the Great War.

In the present study of strategic movement by rail an endeavour is made to marshal the evidence of 1914, which appears to be recorded only in foreign publications.[1] Of 1914 advisedly, because it includes those opening months of the war which were characterized by the initial concentrations and mobile warfare ; because the railways were efficient to a degree impossible of attainment in 1918, in view of the depleted personnel and over-strained equipment.

Since 1914, however, new factors have arisen : the air, for instance, first and foremost ; the greater mobility of modern armies, or at least of fractions of those armies ; and the mass production of war material. These new factors are not obscurely technical, and their influence may be widely experienced.[2] But before pondering the effects of hostile interference, it is advisable first to examine the bare problem of strategic movement as a technical operation ; for this aspect of rail movement should not be of interest only to the few engineer officers whose special study is transportation. A strain of quiet criticism runs through almost all the technical sources which have furnished material for this study—French, German, and Austrian alike ; a criticism of the commanders, senior staff officers and heads of services in 1914 for their ignorance of the capabilities and limitations of the instrument at their disposal. To those interested in these problems may now be added air officers commanding and air staff officers, whose object at some future date may be to paralyse that instrument.

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[1] See Appendix A.

[2] See also article on " Electric Railways in War," R.U.S.I. Journal for August 1925, p. 478.

PART I. THE INITIAL STRATEGIC CONCENTRATION.

The Transportation Problem at the Outbreak of War

For a Continental power the outbreak of war involves three principal categories of military movement :—

(*a*) Mobilization.
(*b*) The establishment of covering forces on the frontier.
(*c*) The strategic concentration.

Each presents a different problem. Mobilization involves the movement of innumerable individuals, small parties, and stores in all directions to the various mobilization centres at a period when civil traffic is still at its usual, if not at an abnormal, level. The establishment of the covering forces in position means the movement of complete units and formations at a time probably coincident with mobilization ; while either or both functions may conceivably overlap the strategic concentration. This involves the continuous and intensive movement of complete formations from the interior to their concentration areas, making use of all routes available.

It is important, however, to remember that during the days immediately prior to and following a declaration of war other movement is taking place. This may be classified, in continuation of the above headings, as :—

(*d*) The maintenance traffic of the armies during mobilization and concentration : small in comparison with other movements.
(*e*) Civil traffic, which cannot be entirely suspended ; and the evacuation of refugees and material from frontier districts exposed to invasion constitutes a special problem.
(*f*) Technical movement, i.e., movement in order to place the technical service itself upon a war footing (what the French call the railway's "toilette") ; technical maintenance traffic, e.g. ballast and loco. coal trains ; and, last but not least, the perpetual movement of rolling stock to meet all these demands upon the railway. With every troop train, for instance, must be linked the marshalling and movement of empty stock to the entrainment station and of the stock again empty from the point of detrainment. Some figures indicating the volume of these various catagories of movement during the French and German concentrations will be given later.

Volume of traffic, however, is not the sole measure of the strain upon the railway system. On the outbreak of war the whole complicated

system of peace-time rail movement is distorted by the substitution of military for economic necessity. This sudden change involves a re-adjustment psychologically no less than in the details of technical working. On the French Est system, for instance, if reckoned in total number of trains, traffic during the first few days of August, 1914, was slightly less than normal peace traffic; yet assistance was required from other systems owing to the altered nature and direction of flow. The principal difficulties were the overburdening of the telegraph lines and the mental strain on the staff due to the sudden change from accustomed working. During this period of transition there were naturally minor mishaps and misunderstandings: in particular the evacuation of material from the frontier districts was complicated by the initial withdrawal of all troops 10 kilometres from the frontier and by the movement of refugees. With the establishment in position of the covering forces on 3rd August, together with immunity from hostile interference, order returned. In the future such immunity cannot be counted on, and the psychological reactions of exposure to air bombing need serious consideration.

Now the pre-war conception of a modern war as short and to be decided in large measure by the issue of the initial operations led naturally to constant preoccupation with the processes of mobilization and concentration. These processes could be accelerated only by:—

(*a*) Improving technical methods and facilities.
(*b*) Working out all programmes of movement in extreme detail to exact timings.

Technical Efficiency and Strategic Plans

For many years preceding the War the Continental Powers spent freely on new construction, double tracking, fly-over junctions and avoiding lines, additional loops, sidings, and military platforms; on improving and standardizing line equipment, strengthening track and bridges to carry heavier locomotives; on continuous brakes for goods trains; and on operating methods, such as centralized telephonic control of train movement. Though not without economic value, these measures far exceeded commercial requirements in peace.

Strategic railway construction was carried farthest by the Central Powers, as was natural from the circumstance of their being on interior lines. In Austria-Hungary the problem was complicated by the past history of the railway system, which had been built to no unified plan; by the poverty of those regions most exposed to invasion, such as Transylvania and Bukowina; and by natural obstacles, such as the Alpine frontier with Italy and the Carpathians which shut off Galicia.

Nevertheless during the ten years previous to the War, despite financial stringency, there was a marked increase of efficiency in the system as a whole for purposes of national defence.

In Germany, during the years of tension immediately preceding the War, work continued uninterruptedly on a comprehensive scheme for the improvement of the strategic railway system, and the outbreak of war found the German railways at a pitch of development which satisfied in every material particular the requirements of the Higher Command. In the West fifteen bridges in all had been built over the Rhine between Strassburg and Wesel; thirteen independent double-track routes were available for strategic concentration; and four double-track lateral lines so that within three days the fighting troops of four army corps could be transferred from one to the other wing. In the East—three main routes in Upper Silesia, but only two through double-track routes East of the Vistula; yet sufficient for the small forces allotted initially to the eastern front. Across Germany—four East and West double-track routes (West of the Vistula). The military value of the German railway system was further enhanced by its high operating efficiency. A rough indication of operating efficiency is afforded by the ratio of locomotive and rolling stock to route mileage, and by figures for line capacity, running speed, and maximum train load—essential data for any movement calculation.[1]

The calculation of *line capacity* requires some explanation. With the passage of the civil railway system to military control on the outbreak of war the complex of peace-time passenger and goods services gave place in all Continental countries to a military timetable with all traffic moving at an uniform economical speed to achieve maximum density. In such circumstances the length of block section and the running speed determine the time interval between trains: hence the number of paths available, shown as a graphic timetable on Plate I. In practice, a proportion of such paths, at least 15 per cent, must be held spare, i.e. not allotted to scheduled trains, as a margin for unforeseen delays or emergency movement.

Running speed, the maximum admissible on level stretches, varied in each country according to the standard of permanent way, bridges, etc. The figure for Germany was rather low. Actually revision of the military timetable began in 1913, based on a running speed of 25 m.p.h. over main lines; coupled with further strategic construction, this would have appreciably quickened the process of concentration, but the War came before these proposals had matured.

[1] A comparative table for the Central Powers and France in 1914 will be found in Appendix B. See p. 91.

Maximum train loads, reckoned in axles for personnel and empty stock trains and in gross tonnage for supply trains, were low if judged by peace standards: 600 tons gross load corresponds to little more than 300 tons average net load for all classes of military traffic; but the monontonous uniformity of all movement under the military timetable meant that the standard train load must be within the capacity of the great majority of locomotives in service.

In Austria-Hungary the maximum train load was reduced over certain hill sections to 70 or 50 axles. Even so, on some heavy grades, to maintain the through load meant two or even three locomotives on the train; so that against Russia or Italy the number of heavy locomotives available to work through trains over the hill sections constituted a limiting factor in the rate of concentration—a fact of some significance.

To summarize—improvements in technical efficiency prior to the War permitted both greater freedom and greater density of strategic movement: greater freedom gained not only by new construction but also by the standardization of equipment and improved control; greater density by increases in train load, running speed, and line capacity.

This technical development was, of course, influenced by the current conception of national strategy. But the inevitable reaction should be noted. The construction of new railways tended to crystallize the strategic ideas which had brought them into being; variants were possible only within strict limits, and improvization meant chaos. In France, for instance, the variety of plans which emanated from the Ministry of War between 1870 and 1914 may be said to have had at least one beneficial effect: the whole, and not only part, of the Est system was at one time or another raised to a high standard of efficiency; so that Plan XVII, which came into force on 15th April, 1914, implementing the doctrine of the offensive, could make use of all lines leading to the frontier. But this preoccupation with movement solely to the frontier was responsible in large degree for comparatively poor lateral communications[1]; and ability to reinforce the left wing more quickly might have had important strategic results in August, 1914.

This nemesis may be illustrated even more effectively from the Russian concentration; for in Eastern Europe transportation needs in peace are insufficient to cover shortcomings in strategic planning for war. Alternative plans were drawn up in 1910—Plan A concentrating thirty divisions on the North-West front, and Plan G concen-

[1] There was, for instance, no double line lateral nearer to Paris than Chalons–Reims–Laon–Amiens.

trating forty-one, according to whether Germany directed her main effort against France or Russia. All details of Plan A and almost all of Plan G had been worked out by August, 1914. The decision which plan to adopt could, so far as the railways were concerned, be deferred till the seventh day of mobilization. In consonance with the strategy of these plans and of their predecessors, North-West Poland was and remained almost destitute of communications. But French representations, urged with increasing force at the Staff conferences of 1911, 1912 and 1913, led the Russian General Staff to promise not only an earlier invasion of East Prussia, but also that the centre of gravity of their forces would be shifted further West.

Mobilization was ordered on 31st July. By 6th August the direction of Germany's main effort was beyond doubt, and France appealed for early action by Russia. Russia decided to honour her word; not, however, by adopting Plan G, but by improvization. The First and Second Armies were hurried forward, the latter edging to its left, while a Ninth Army began forming in the neighbourhood of Warsaw with the prospect of traversing an area specifically designed to be an obstacle to movement. Its elements were drawn partly from the First Army, and two whole corps were passed from the northern flank right across the communications of the First and Second Armies. The consequent delay to their rear services was not without influence on the issue of Tannenberg.

This rigidity, arising, particularly in the more backward countries, from the close association of railway construction with specific strategic plans, was immeasurably increased in 1914 by the complexity of the concentration programmes.

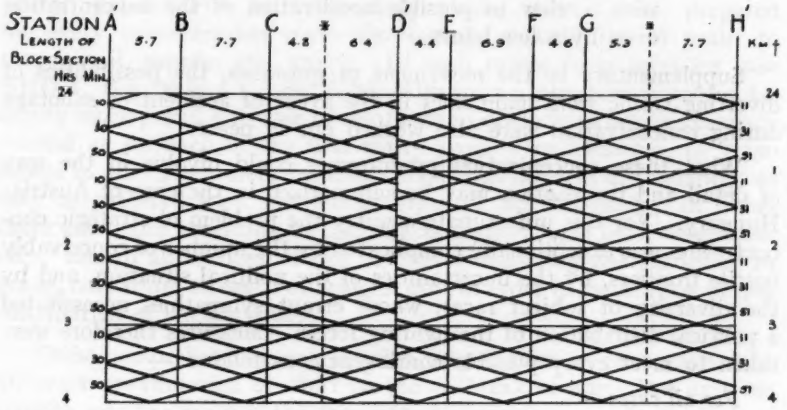
Concentration Programmes

Programmes, not only for strategic concentration but for all military and even civil movement, following the suspension of peace timetables, were prepared by the Railway Section of the General Staff, acting in liaison with the military section of the civil railway administration. The foundation for all movement was the military timetable, in Germany comprising about 3,000 section timetables of the type illustrated on Plate I, for all lines of military importance. Upon this framework could be woven the detailed movement programmes in accordance with the requirements of the General Staff. These programmes were overhauled every winter, revision taking its departure from :—

(*a*) Any modification of strategic plans.
(*b*) Any alteration in war establishments or location of units.

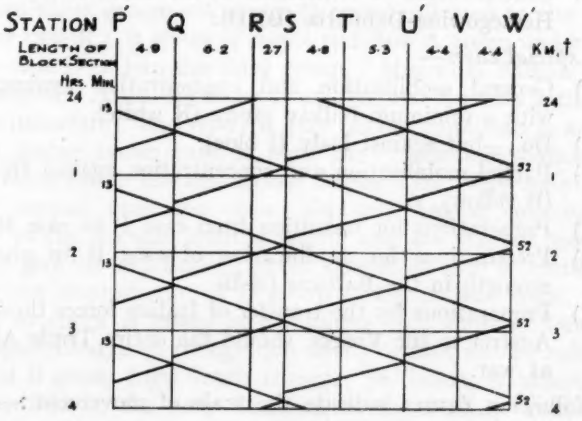
Plate I

GRAPHIC TIMETABLES



SECTION A-H

DOUBLE LINE – 72 PATHS EACH WAY DAILY



SECTION P-W

SINGLE LINE - 24 PATHS EACH WAY DAILY

' LOCO WATERING STATION

* INTERMEDIATE BLOCK POST

† 1. KILOMETRE = ·625 MILE

(*c*) Constant study of the technical situation as modified, for instance, by new construction or increased line capacity, with a view to possible acceleration of the concentration even by a few hours.

Supplementary to the movement programmes, the possibilities of diverting traffic from main lines in the event of accident or sabotage during concentration were also worked out in peace.

What these concentration programmes could involve in the way of detail and its reaction may be summarized in the case of Austria-Hungary. For this unfortunate country the problem of strategic concentration was exceptionally complicated by the number of conceivably hostile frontiers, by the uncertainties of the political situation, and by the diversity of subject races, whose errant sympathies necessitated a political distribution of the fighting forces. Measures therefore were taken to meet every possible contingency, as follows :—

For all cases—

(i.) Technical mobilization and the assumption of control over the railways by the military authorities.
(ii.) Certain mobilization movement.
(iii.) Concentration of formations of the Sixth Army in Bosnia-Herzegowina-Dalmatia (BHD).

For special cases—

(iv.) General mobilization and concentration against Russia, with a minimum Balkan group (R white).
(v.) Do.,—but against Italy (I blue).
(vi.) Partial mobilization and concentration against the Balkans (B yellow).
(vii.) Preparations for transition from case B to case R (B-R).
(viii.) Preparations for modification of case R to give greater strength in the Balkans (R-B).
(ix.) Preparations for the transfer of Italian forces through West Austria to the Vosges, should the entire Triple Alliance be at war.

The following figures indicate the scale of movement :—

(1) Mobilization trains, mostly small and for short journeys—case R 9,000 ; I 9,000 ; B 3,000.
(2) Covering troop movement and strategic concentration—case BHD 600 trains ; R 3,000 ; I 3,000 ; B 1,000.
(3) Movement of Italian troops (Triple Alliance)—600 trains ; movement of second line formations in the interior—500 trains.

To meet all these various contingencies a multitude of movement calculations were worked out in exact detail on white, blue and yellow paper. For instance, daily route sheets were prepared for every concentration route shewing the distribution of paths to troop, mail, supply, etc., trains. Of such routes there were for case BHD 1, B 3, R 8, 1 5, and Triple Alliance 3 ; also return routes for empty stock ; and 5 in case of reinforcing Galicia from South Hungary —total 45 for each of the first thirty days of mobilization, or 1,350 sheets in all. The purely technical detail was not less intimidating, as may be gathered from the classification of all locomotives in forty-three categories according to their tractive effort, axle load, wheelbase, etc. ; and of all sections of line in twenty-one categories according to grade, curvature, strength of bridges, etc., in order to facilitate a proper distribution of engine power.

These comprehensive and detailed preparations in peace aimed at an exact co-ordination of effort on the outbreak of war. But extreme rigidity was the result : the concentration programme admitted of no important modification at short notice without the likelihood of chaos.

The sequel may be briefly told. The Austro-Hungarian Army was divided into three groups—A group (9 corps), allotted to the Russian front under case R ; B group (4 corps) to follow A group under case R, but under case B to join the third group, " Minimum Balkan," on the Serbian frontier. After the incident at Serajevo Russia's attitude was for a time uncertain ; and on 27th July partial mobilization and troop movement began under case B, both the " Minimum Balkan " and B groups being set in motion against Serbia. But very soon Russia's intentions became only too clear. On 2nd August covering troop movement to the Russian frontier began, and 4th August became the first day of general mobilization under case R—a case R mutilated by the premature commitment of B group to the Balkan front. It was impossible to check B group in mid-career (the Railway Directorate made this quite clear) and, though case B-R provided for the subsequent diversion of B group from South Hungary to Galicia, it unfortunately became involved in the early disasters on the Serbian front. What portions were ultimately transferred to Galicia completed detrainment on 8th September, eleven days late on case R schedule and just in time to be swept away in the rout of the Austrian right wing.

The Austro-Hungarian plans of concentration admittedly represent an extreme of complexity. Germany was more fortunate in the certainty of her line of action ; and her concentration on the Western front is worth studying in some detail.

The German Concentration

Till 1913 alternative plans of concentration East or West were worked out in detail, but from that date a major concentration was envisaged only on the Western front.

Four periods may be distinguished during the critical days of July and August, 1914: up to 12 noon 31st July—preliminary measures quietly taken as political tension developed into the certainty of war; from the "war imminent" warning order issued at that hour to the order for general mobilization at 5 p.m., 1st August—measures of security and preparations for war openly pushed on; the mobilization period till 6th August; and the strategic concentration during 6th—17th August.[1]

Before turning to the four main categories of movement—mobilization; covering troop moves and strategic concentration; civil traffic; and technical movement—some particulars of the executive organization are necessary by way of preface.

i. The executive organization.—By 1914 Germany, like other Continental Powers, had developed an organization for co-ordinating military requirements with technical possibilities of the type now familiar to us from the Manual of Movement, i.e. a parallel hierarchy of military and technical officers intimately associated at each level of responsibility.

The fount of policy in peacetime was the Chief of the General Staff in close touch with the Imperial Railway Bureau, the central organ of the civil railway administration. The galvanic body was however the Railway Section of the General Staff, the personnel of which was drawn from the most intelligent stratum of staff officers—and commonly regarded as approaching lunacy! The head of the Railway Section was responsible for the co-ordination of all measures of preparation for war, e.g. new strategic construction, mobilization and concentration programmes, and arrangements for assuming control of the civil railway system. The collection of technical information and the detail work of movement plans devolved largely upon Line Commissions, comprising one military and one technical member with a mixed office staff. Of these commissions there were twenty-six in Germany, with their headquarters at important railway centres and their spheres of action corresponding generally to the operating divisions of the State railway system.

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[1] Further details are given in Appendix C, where it is of some interest to compare the corresponding French times. See p. 91.

In war control was centralized at General Headquarters, the head of the Railway Section becoming Director of Railways under the Quartermaster-General. In Germany, as *Chef des Feldeisenbahnwesens*, his charge amounted to the co-ordination of all transportation resources for war purposes, and his sphere of authority embraced all railways of military importance without exception, both at home and in the theatre of operations ; whereas in France, with war on a single front, the Zone of the Interior, as distinct from the Zone of the Armies under General Headquarters, was under control of the Ministry of War. The Line Commissions (*Linienkommandanturen*), supplemented by lower organisms and later by additional appointments in occupied territory, now assumed responsibility for the technical execution of military requirements under instructions from the Director of Railways, who was also represented by liaison officers (*Bahnbeauftragte*) from his Section acting as technical advisers at all Army and Line of Communications Headquarters. For the repair, equipment and working of lines in occupied territory the Director of Railways disposed of operating and construction companies amounting in all to over 30,000 men.

ii. Mobilization.—Mobilization movement programmes, based on information from the military authorities, were revised early in each year at conferences between the interested parties, military and technical. The distribution list for these programmes, to which all mobilization schemes had to conform, was strictly limited in the interests of secrecy.

The movement of reservists and remounts to mobilization centres and of personnel from leave or courses of instruction was largely short distance ; but by no means entirely so, e.g. 68,000 reservists to the Guard Corps from all over Germany, 148,000 to the corps on the eastern frontier, and 112,000 to the corps and fortresses in the West. There were also large transfers of remounts from East and North Germany to the Centre and South. In addition, heavy movement of material during mobilization was unavoidable, e.g. naval coal, fortress armament and ammunition, and material to meet the urgent needs of technical services and key industries ; though such movement was reduced as far as possible by a careful selection of sources to minimize length of haul and by the accumulation of stocks in peace.

General mobilization was ordered at 5 p.m. on 1st August. During the first two days of mobilization (1 M and 2 M days) peace time-tables were still in operation. Though goods traffic was suspended, passenger services were carrying an enormous traffic in returning holiday makers ; covering and line of communication protection troops were being established in position ; and the railway itself was in process of transition from a peace to a war footing. Nevertheless the movement

of reservists and remounts to the frontier corps was superimposed upon this burden. Individuals and small parties travelled by normal services, larger parties by supplementary and special services (*Militärbedarfzüge* and *Militärsonderzüge*)—the former worked out in peace, the latter (700 trains during 1 M and 2 M days) ordered in emergency by arrangement between the military and technical authorities.

These two days were, in fact, those of maximum strain upon the railway system as a whole. At midnight 2/3 M day the military timetables came into operation. For the next three days mobilization movement continued at maximum intensity. From 6 M day it dwindled, to revive only after completion of the strategic concentration. Altogether 20,800 mobilization trains were worked out in peace for the period 1 M—20 M day, carrying 2,070,000 men, 118,000 horses and 400,000 tons of stores.

iii. Movement of covering troops and strategic concentration.—The concentration programme prepared by the Railway Section of the General Staff and revised yearly took final shape in two forms :—

(*a*) Movement lists (*Fahrtlisten*) for the technical service, showing for each section of the railway system and for each M day the units to be moved, strengths, rolling stock required, and timings at entrainment, etc., stations.

(*b*) Movement tables (*Fahr- und Marschtafeln*) for military commanders, showing for each division or equivalent formation the allotment of units to trains, time and place of entrainment and detrainment, stops for watering animals, etc.[1]

For 1 M to 4 M days both movement lists and tables were printed in peace and circulated under secret cover on a minimum distribution list. For movement subsequent to 4 M day they were printed on mobilization.

The concentration programmes distinguished three categories of movement :—

(1) Troops immediately available for frontier, coast and line of communication protection.

(2) Formations mobilizing with exceptional rapidity.

(3) The general strategic concentration.

Movements under category (1) and for the evacuation of threatened frontier districts were worked out *verschiebbar*, i.e. on timings to be

[1] Examples of *Fahrtlisten* and *Fahr-und Marschtafeln* are given in the German Official History (Railways), Vol. I.

determined in emergency by agreement between the Line Commandant [1] and the civil railway administration. The latter accepted responsibility for provision of the necessary rolling stock at short notice.

Urgent troop movements under category (2), taking precedence of mobilization movement, comprised:—

(*a*) Advanced echelons of headquarters.

(*b*) Six reinforced infantry brigades with siege artillery and engineers, detraining during 1 M—3 M days in the Aachen —Eupen—Malmédy region for the *coup-de-main* against Liége.

(*c*) Seven mixed infantry brigades, detraining during 2 M–3 M days along the frontier, as covering troops for the strategic concentration.[2]

(*d*) Four cavalry corps (ten cavalry divisions) detraining and brought up to strength during 2 M–7 M days;

(*e*) Railway troops and supply detachments for preparatory work in concentration areas.

In all 1,440 trains, of which 340 were run as special trains during 1 M and 2 M days when peace timetables were still in operation.

The invasion of Luxemburg was authorized at 12.45 a.m. 2nd August. Part of the 16th Division, in immediate readiness, under escort of an armoured train, was railed straight through to Luxemburg, where it was joined by marching columns during the forenoon. The Luxemburg railway system, important for the subsequent concentration, thus passed intact under German control.

The concentration against Liége was more serious, and was difficult technically because, for reasons of secrecy, details were withheld in peace, and the railway authorities received only a few hours' notice. To illustrate the pressure, eighteen troop trains passed over the single line section München Gladbach—Jülich between 12 noon and midnight on 2 M day, empty stock returning via Düren—Neuss; and twenty-two troop trains over the double line München Gladbach—Aachen between 3 p.m. and midnight the same day. All this, be it noted, on peace timetables with the railways handling at the same time an abnormal passenger traffic, priority mobilization movement, the evacuation of frontier districts, and empty rolling stock freed by the suspension of civil goods traffic.

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[1] *Linienkommandant*, the military member of a Line Commission (see p. 79).

[2] These thirteen brigades received their reservists during 4 M–7 M days.

The main strategic concentration (see Plate II) commenced on the evening of 5 M day (6th August). Timetables included a 4-hour break (*Tagespause*) each day to make good irregular running or delays; the break being designed to occur at night West of the Rhine, where congestion was most likely.

Thirteen independent double-line routes, carrying 660 trains daily, were available for the movement of 34 corps. Of these three detrained East of the Rhine (XIV and XIV R about Freiburg, IV R at Düsseldorf), while of the remainder VIII and VIII R entrained at Köln, XXI at Strassburg and Saarbrücken; so that 28 corps (550 trains daily) actually crossed the Rhine by one or other of the fifteen railway bridges.

Most corps were allotted 20 (a few 30) trains daily, both divisions moving simultaneously, i.e. by trains at 2-hour intervals, excluding the 4-hour break, from the divisional entraining station. The order of movement was :—advanced parties; engineer and supply detachments; cavalry; headquarters; infantry and field artillery mixed; medium artillery and services (*Kolonnen und Trains*): in all about 140 trains for active corps, 85 for reserve corps, and 31 for cavalry divisions, plus supply trains included in the concentration programmes.

Most of the double-line routes carried two, a few three, different corps simultaneously; but in general a maximum of 50 trains each way daily was observed. The heaviest traffic was through Köln, where the South bridge (double line) took 60 troop trains daily and the North bridge (4-track) 2,150 mobilization and troop trains moving West during the period 2nd—18th August, at an average interval of ten minutes.

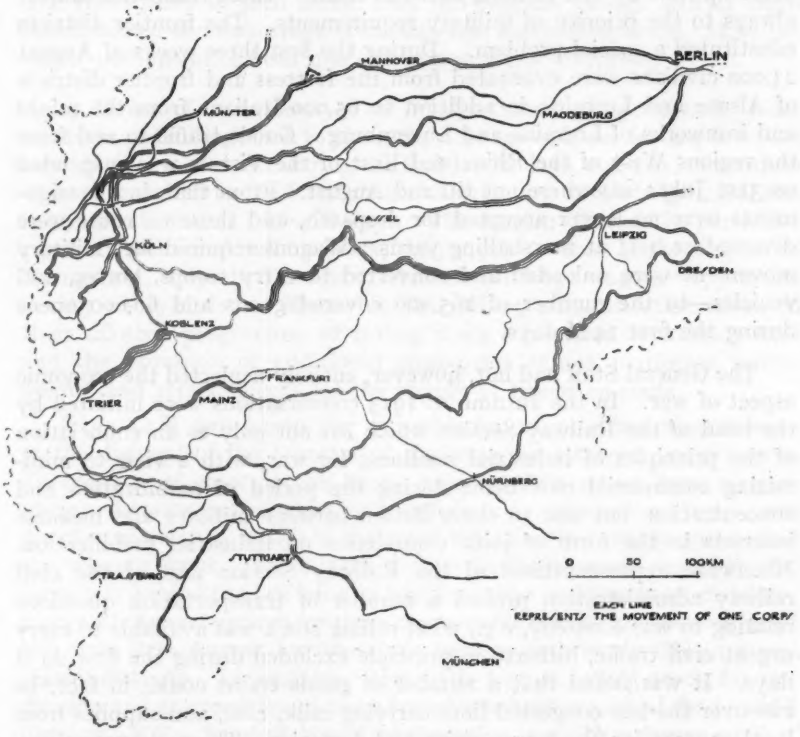
The fighting troops and first echelon of services completed detrainment on 14th August, the second echelon following till 17th August. The whole concentration was executed to programme without serious mishap; delays exceeding 8 hours occurred only in the Palatinate, where congestion developed at Germersheim. Minor modifications of plan by army or corps headquarters, under strict observation by Detrainment Staff Officers (*Ausladekommissare*) representing the Director of Railways in each army, were smoothly executed save in the Gerolstein area (Third Army), where detrainment points were so far advanced as to affect the turn-round of locomotives and rolling stock.

The concentrations in the East and on the northern frontier were relatively simple. In all 11,100 troop trains carried some 3,120,000 men and 860,000 horses.[1]

[1] The corresponding figures for the French concentration were 4,619 trains for some 1,200,000 men and 400,000 horses.

Plate II

THE GERMAN CONCENTRATION IN THE WEST



iv. Civil traffic.—Normal passenger and parcels services continued in operation until 3rd August, under abnormal pressure; for example, 235 special trains were run by the Prussian State Railways on 1st August to cope with returning holiday-makers and the movement of reservists to Austria-Hungary. From 4th August civil traffic was provided for within the framework of the military timetable by 2 to 4 trains each way daily (*Militärlokalzüge*) limited to 60 or even 40 axles with with suitable locomotives so that they could stop at every station and make up time by fast running between them. These trains ran subject always to the priority of military requirements. The frontier districts constituted a special problem. During the first three weeks of August 23,000 civilians were evacuated from the fortress and frontier districts of Alsace and Lorraine, in addition to 65,000 Italians from the mines and ironworks of Lorraine and Luxemburg. Goods traffic to and from the regions West of the Rhine and East of the Vistula was suspended on 31st July: elsewhere not till 2nd August. From that day consignments were no longer accepted for despatch, and those en route were diverted or held at marshalling yards. Wagons required for military movement were unloaded and converted to carry troops, horses, and vehicles—to the number of 165,000 covered goods and 60,000 opens during the first 14 **M** days.

The General Staff had not, however, entirely neglected the economic aspect of war. In the autumn of 1913 conversations were initiated by the head of the Railway Section which led not only to an enunciation of the principles of industrial readiness for war, with a view to minimizing commercial movement during the period of mobilization and concentration, but also to closer liaison between military and business interests in the form of joint committees on industrial mobilization. Meanwhile representatives of the Railway Section and of the civil railway administration probed a number of transportation questions relating to war economy, e.g., what rolling stock was available to carry urgent civil traffic, hitherto in principle excluded during the first 20 M days. It was found that a number of goods trains could, in fact, be run over the less congested lines carrying milk, coal, and supplies from local sources for the larger cities and factories. These conversations, however, were cut short by the early outbreak of war.

The provision made for civil traffic within the military timetables soon proved insufficient. The *lokalzüge* were overcrowded and ran very late through heavy station work and shunting to pick up urgent goods; while from 7th August they were suspended altogether on the main concentration routes. A clamour arose from public authorities and industrial undertakings all over Germany for the release of urgent

supplies and raw materials. So far as military requirements permitted, the demand was met by the interpolation of goods services upon a scale sufficient to avoid a crisis. No interference with the concentration programmes was permitted, but much extra work was thrown on the responsible military and technical officials. Real difficulty was experienced only in the Rhineland, where the lines were congested with military traffic. The most urgent demands were for supplies to the large cities, and for coal and raw materials to the works in the Ruhr district. The resumption of such traffic from 9th August, though strictly regulated, caused some shortage of locomotives and rolling stock. More use might perhaps have been made of inland water transport.

v. Technical movement.—The readjustment of personnel, locomotives, and rolling stock to place the railways on a war footing involved considerable movement during the first few M days, e.g. 180 locomotives to be despatched to the Saarbrücken district, 150 to Ludwigshafen, etc. —530 in all during 1 M–4 M days. The eastern districts in particular required additional rolling stock, e.g., 2,300 covered goods wagons to Königsberg, 1,850 to Bromberg, etc.—in all 8,650 wagons=173 trains during 3 M–9 M days. Meanwhile the railway administration executed their allotted programme of rolling stock conversion to military uses and the provision of additional cross-overs, ramps, platforms, water-points, and arrangements for the supply of troops en route.

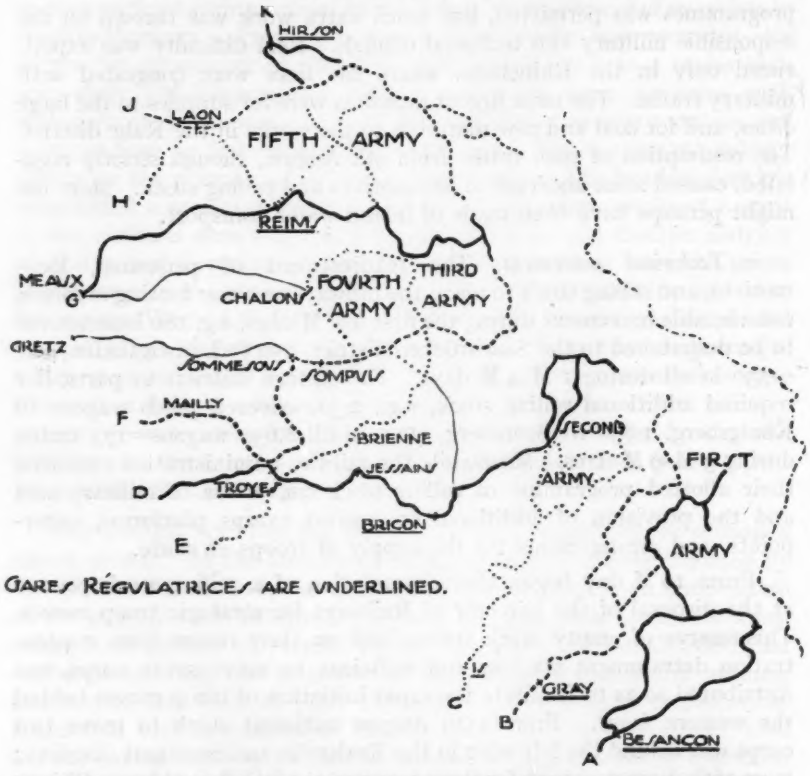
From 10 M day began the accumulation of a rolling stock reserve at the disposal of the Director of Railways for strategic troop moves. This reserve of empty stock trains, held on their return from concentration detrainment stations and sufficient to move seven corps, was distributed so as to facilitate the rapid initiation of troop moves behind the western front. From 11th August sufficient stock to move two corps was behind the left wing in the Karlsruhe and Stuttgart districts; from 16th August enough for three corps on the middle and lower Rhine; and from 21st August for two corps further back in the Münster and Kassel districts. In addition, from 13th August rolling stock for one division and a proportion of corps troops was held in each of the forward districts—Köln, Saarbrücken, Ludwigshafen, and Strassburg—so that the forward Line Commandants were in a position to execute tactical troop moves from their own resources and to meet the first requirements of large strategic moves without delay.

The French Concentration

The French concentration bears a general resemblance to the German, though the forces to be moved and the routes available were

Plate III

THE FRENCH CONCENTRATION



LINE	CORPS	FROM	LINE	CORPS	FROM
A	VII	BESANÇON	F	V	ORLEANS
	XIV	LYON		COLONIAL	PARIS
B	VIII	BOURGES	G	IV	LE MANS
	XIII	CLERMONT-FERRAND		XI	NANTES
C	IX	TOURS	H	III	ROUEN
	XVIII	BORDEAUX		X	RENNES
D	XV	MARSEILLE	J	II	AMIENS
	XVI	MONTPELLIER			
E	XII	LIMOGES	K	I	LILLE
	XVII	TOULOUSE			

rather fewer. Plan XVII envisaged an immediate offensive with all available forces. Concentration would commence at 12 noon on 4 M day, employing ten separate routes (*lignes de transport*) lettered A to K (see Plate III). Of these routes A to H took two corps each, and the majority some reserve or cavalry divisions as well.

The period of concentration was divided into two phases—4 M+12 hrs. to 11 M+12 hrs., during which the fighting troops of active corps and their essential services would be concentrated in readiness to advance any day after 12 M day; and 12 M to 17 M for the movement of reserve formations and less urgent rear services. At the last moment (warning 30th July, confirmed 3rd August) Plan XVII was modified in regard to the detrainment areas of the Fourth Army, affecting lines D, E and G. This alteration however approximated to a variant of Plan XVII foreseen and worked out in 1913.

Military timetables were drafted on the basis of 72 paths each way daily on the principal double lines; but actual troop movement rarely exceeded 48 trains a day.[1] Altogether 4,035 troop trains were run over the 10 *lignes de transport* on the Est system during the period of concentration. Yet this figure, even doubled so as to include the returning empty stock trains, fell far short of the total for all other traffic—12,500 trains, though largely short distance, for the same period.

The concentration was completed to programme. A few minor collisions, engine failures and broken couplings caused temporary delays of 2 to 4 hours, but the time lost was subsequently regained. In the neighbourhood of Troyes, however, a series of more serious accidents occurred between 8th to 10th August, affecting lines D, E and F. These are of some interest as the measures taken to minimize delay apply to any form of interruption.

At 9 p.m. on 7th August a troop train was run into by the following train at Brienne, and a train in the reverse direction derailed among the debris. This involved a probable delay of six hours, and movement was checked on line E. But by 1 a.m. it was known that the interruption was more likely to last twelve hours, and traffic was diverted via both Sommesous (line F) and Jessains (line D). Single line working was resumed at Brienne at 10 a.m., double at 11.20 a.m. on 8th August. But at 4.30 a.m. another accident had occurred at Bricon on line D, which was already congested by the diversion of traffic from line E, leaving however one of the four lines clear. Employment of the 50-ton

[1] Supply trains brought the normal density during concentration up to 56 trains a day.

crane at Brienne delayed its arrival at Bricon, where the lines were not open till 5 a.m. on 9th August. To relieve line D the entrainment of certain units was postponed.

There was more to follow. At 6.40 a.m. on 9th August a collision at Mailly promised to block line F all day. Traffic was in part diverted over the line Gretz-Sommesous, while returning empty stock was partly routed via Chalons—Meaux. By a temporary deviation single line working was opened at Mailly at 6.15 p.m., but double line working could not be resumed till 9.30 a.m. on 10th August. By then a collision at 5.25 had blocked both lines at Sompuis; and three other accidents occurred during the 9th and 10th.

The measures adopted to minimize delay were:—

(*a*) Rapid repair, and opening for single line working as early as possible with priority for loaded trains.
(*b*) Diversion of flow to other routes.
(*c*) Increased rate of flow on reopening double line, up to three trains an hour—the maximum number of paths provided by the military timetable.

Diversion, with all available concentration routes in use, could only be over ill-equipped branch lines or over main lines already carrying heavy traffic; diversion, moreover, from a point some distance in rear of the obstruction, alters the order of arrival of units. Increased density risks congestion on the terminal sections: detrainment must be accelerated or the number of detrainment points increased. In the last resort the current must be cut off at source by suspending entrainment. The value of a break to take up slack, such as the 12-hour interval on 11 M day in France or the German 4-hour *Tagespause*, is obvious.

Comments

The general impression left by a study of the initial concentrations in 1914 is that of a vast clockwork machine functioning with inflexible precision. Where there was no element of political or strategic uncertainty, plans were executed to programme: for it had been possible to calculate the technical factors with exactitude. The data—line capacity, rolling stock available, etc.—were all known.

Post-War conditions have introduced a new and incalculable factor. The railway system cannot be screened from hostile interference. Methods of air attack and air protection fall outside the scope of this article—they constitute a purely military problem; but their reactions need examination. Protection can never be complete. Therefore to avoid paralysis by air attack, or by the mere threat of air attack, a far greater measure of elasticity than obtained in 1914 is necessary. Now a

railway system is inelastic when congested. In 1914 the concentration of maximum forces on the frontier within a minimum time imposed a maximum strain upon the railways; their capacity was indeed a limiting factor. The same density of traffic is no longer possible; at least, it can no longer be guaranteed.

A reduction of density is being effected in several ways. First, modern armies tend to be smaller than in 1914, while the increase of mechanical transport permits some relief of the railways and a greater depth of the concentration area: in fact, the forces to be moved are less. Second, the continuance of strategic construction since the war is increasing the number of routes available. Third, the creation of a protected frontier, as by France, makes the time factor less critical.

This decreased density of military movement over the system as a whole, though not necessarily over every part, not only counteracts in large degree the menace of air attack on the scale probable at the outbreak of war, but it also restores the railway system to its place as an instrument of strategy from the very outbreak of war. In 1914 the initial concentrations were sharply distinguished by their rigidity from the subsequent strategic moves in course of operations. But that this was not strictly necessary, even under the circumstances of 1914, the German Official History bears witness. "The determination to concentrate against France took shape in a movement programme so rigid from excess of detail as seriously to restrict political and military freedom of action. Greater flexibility would, within limits, have been possible. The Railway Section of the General Staff was practised in peace time in the rapid calculation of large troop moves; and in particular, by war games, in variants and modifications of the concentration plan. . . . Necessity and practice under war conditions developed a less rigid technique of movement control, applicable no less to the initial concentration. . . . At the outbreak of war indeed, both the military and technical railway authorities were sufficiently familiar with more flexible methods to ensure the rapid execution of concentration variants or strategic troop moves; but this knowledge had not penetrated to the higher commands and staffs." [1]

The more flexible methods referred to and the strategic employment of railways in 1914 will be examined in Part II.[2] It is therefore better to defer comment on the technical aspect of strategic concentration. Reference is necessary, however, to another factor insufficiently appreciated in 1914, namely the economic bias of modern war. The demands

[1] German Official History (Railways), Vol. I, p. 21.

[2] Part II of this article, dealing with "Strategic Movement by Rail during Operations," will be published in next quarter's JOURNAL.—EDITOR.

of industry, mobilizing like the armed forces, must be co-ordinated upon a national basis, while the transportation services of the country should suffer as little dislocation as possible. The transition from peace to war, also, may be less abrupt than in 1914, under the influence of political manœuvring to avoid the stigma of aggression. These considerations, coupled with the smaller volume of purely military movement, suggest that there will be less hurry to substitute a uniform military timetable for the accustomed methods of working. The flexibility of the technical instrument as it exists in peace was proved in 1914 by the abnormal traffic handled during the first two days of mobilization (see pp. 81 and 84). Marchand[1] considers a rigid mobilization movement programme impracticable: the traffic can be handled by increased accommodation on normal, with some supplementary, trains; while for *couverture*, instead of a single operation, delayed perhaps by political hesitation until it interferes even with concentration, he suggests a progressive reinforcement of the troops on the frontier, quietly effected in the intervals of normal traffic. One thing is certain: to achieve the best results the chief officers of the civil railway administration must be taken into the confidence of the military authorities.

APPENDIX A. BIBLIOGRAPHY.

This is not a complete bibliography, but an expression of the author's indebtedness to his principal sources.

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APPENDIX B. COMPARATIVE TABLE OF TECHNICAL DATA FOR CONTINENTAL RAILWAY SYSTEMS IN 1914.

	France.	*Germany.*	*Austria.*
Route mileage	39,045	61,404	45,000 kms.
Locos.	13,800	29,520	11,967
Passenger coaches	49,300	65,180	32,642
Goods wagons	356,000	689,190	265,864
Locos. per km. operated	0.35	0.48	0.26
Wagons per km. operated	9.1	11.8	5.8
Line capacity :—			
Main lines (double)	72	72	60–48 } paths each
Single lines	—	36–24	30–15 } way daily
Running speed	35–30	30–25[1]	40–25 km.p.h.
Journey speed — average during concentration :			
Double lines	—	Under 20	18 km.p.h.
Single lines	—	—	11 km.p.h.
Maximum train load :—			
Axles	—	110	100
Tons gross	550	600	500

APPENDIX C. EVENTS IN GERMANY AND FRANCE, JULY–AUGUST, 1914.

Date.	*Germany.* (Times reduced to G.M.T. as for France.)	*France.*
Political tension July 26		
28	Security measures " in event of political tension " ordered, e.g. recall of covering troops away from their stations ; policing major engineering works ; and preliminary technical preparations.	" War inevitable " warning— preparatory measures and movements quietly set in operation during 27–30 July, i.e. recall of covering troops, other troops following later from training camps ; guards for vulnerable points on the railways (from 28 July) ; and technical preparations, e.g. suspension of non-essential engineering works, clearing
29	(late) Recall of all other troops to their own stations : military guards on major engineering works in frontier districts.	

[1] Raised towards the end of 1914 to 25 m.p.h. on main lines.

Political tension.	July		
	30	*Sicherung* order to the fleet, involving some movement of troops for defence of North Sea islands.	sidings and platforms for " couverture " movement, evacuation of surplus rolling stock and stores from frontier districts, and preparation of an armoured train at Belfort.
	31	Trans-frontier traffic ceases.	
Movement of covering forces.		(12 noon) *Drohende Kriegsgefahr* order—full measures for security of railways. (Later) *Verschiebbar* movement for frontier, railway and coast defence set in operation : clearance of East Prussian remount depots to the interior : and evacuation of surplus rolling stock from frontier districts.	(11 a.m.) *Deuxième avis préalable*—measures openly pushed on, e.g., evacuation of frontier stations and preliminary rolling stock movements. (5.55 p.m.) *Ordre de Couverture*—zero for covering troop moves, 9 p.m.
		Civil goods traffic suspended West of the Rhine.	Slow goods traffic suspended.
Mobilization.	Aug.		
	1	(4 p.m.) Order for general mobilization. Railways pass under military control and commence transition to war footing.	(4 p.m.) Order for general mobilization, including railway mobilization.
	2	All civil goods traffic suspended.	
	3		(12 noon) Covering troop movement completed.
Concentration.	4	(Midnight 4/5 Aug.) Miltary timetables put in operation.	
	5		(12 noon) Strategic concentration commences.
	6	(evening) Strategic concentration commences.	
	13		Fighting troops and essential services complete detraining.
	14	Fighting troops and essential services complete detraining.	
	17	Concentration completed.	
	18		Concentration completed.

WARSHIP CONSTRUCTION UNDER THE NAVAL TREATIES

By Maurice Prendergast.

THE "Treaty for the Limitation of Naval Armament" was signed at Washington on 6th February, 1922, and was ratified by all Powers interested on 17th August, 1923. On 29th December, 1934, Japan, one of the five Signatory Powers, gave formal notice of her intention to withdraw, and the consequence of her action is that the said Treaty will expire on 31st December, 1936.

The "International Treaty for the Limitation and Reduction of Naval Armament" was signed in London on 22nd April, 1930. Parts I, II, III and V thereof expire on the same date as the Washington Treaty, but Part IV, concerning the conduct of submarines under International Law is to "remain in force without limit of time."

The 1935 Naval Conference will therefore have to face the formidable problem of producing a new Naval Treaty that will replace not one but two moribund ones. What the Conference may attempt, achieve, and fail to accomplish need not be here discussed. Let us rather regard the ships of our 1934 Programme, some of which are now just taking shape, whilst others, at the moment of writing, have not been contracted for, much less begun. The last of those ships will not pass into the fleet until after the two standing Naval Treaties have expired. Accordingly, the ships of our 1934 Programme will be the last we shall lay down, launch, and complete under the old dispensations of Washington and London. If those ships stand for Omega, we can go back through their successive predecessors until we reach Alpha. From end to beginning and from beginning to end, we can now estimate the effects of the two expiring Treaties upon the destinies of the Sea Powers.

How many warships do the five great navies possess to-day, taken all together; and how many did they own in 1922? By this test we might ascertain if the Naval Treaties have attained their avowed purposes of curbing and cutting down naval armaments. The writer cannot provide an answer for the whole of the period 1922–35, but he can furnish one for the latter half of it. Take the official returns entitled *Fleets* (*The British Commonwealth of Nations and Foreign Countries*) for the years 1927 to 1934. Each issue is prefaced by summarized statistical tables, giving all the warships built, building, and projected, belonging

to the five great naval Powers, the Soviet Union, and Germany. The Soviet Union and Germany we can ignore, inasmuch as they did not sign the Naval Treaties of 1922 and 1930. With projected ships we need not concern ourselves either, seeing that many intended ships have never been begun. After making such adjustments, we get the following results:

I.—*WARSHIPS (BUILT AND BUILDING) OF THE FIVE GREAT NAVAL POWERS.*

Year.	*Built.*	*Building.*
1927	1,887 ..	207
1928	1,801 ..	211
1929	1,775 ..	200
1930	1,734 ..	241
1931	1,689 ..	236
1932	1,656 ..	237
1933	1,653 ..	202
1934	1,624 ..	213

Here we have something in the nature of vital statistics. The figures entered under the "built" column represent, as it were, a census of the entire warship "population" of the five big navies taken over a period of seven years. In the "building" column we get an idea of the total annual "birth rate" of new ships for the same five countries over the same period. In "population" we find a decline from start to finish, and in "birth rate" fluctuation. The variation in the numbers of ships building is not, however, very large, for the figures neither rise above 250 nor sink below 200, so that the "birth rate" is almost stationary. The inference to be drawn from these figures is obvious. "Deaths," as represented by the scrapping of old ships, are in excess of "births" as represented by the building of new ones, and therefrom arises the steady decline in "population." If the five Sea Powers do not build at a higher rate than 200–250 new vessels per year, then their fleets will go on diminishing in the future as they have done in the immediate past.

"Limitation" has been achieved, and our figures seem to show that "Reduction" has likewise been attained; so it might be said that the Treaties have done their work and done it well. But our totals include such types of naval vessels as sloops, gunboats, minesweepers, etc., and, by the Treaties, the Sea Powers were under no obligation to reduce their stocks of these ships. The truth would appear to be that the reducing work has been done in part by the Treaties and the rest

by *anno domini* and poverty: aged and worn-out ships have been discarded; want of money has prevented the building of their replacements. The living have not supplanted the dead in full, and so the fleets have gone on dwindling and dwindling from year to year. Economic duress and deterioration may form a surer and more silent method of limiting and reducing naval armaments than all the bargainings and verbiage of conferences and compacts.

The American "opposite number" to our return *Fleets, etc.*, is the statement *Comparative Strength of Navies*, which, we believe, is compiled and issued by the Bureau of Naval Intelligence of the Washington Navy Department. There are two interesting and useful Tables in this American document: one is headed, "Ships laid down and/or appropriated for since the Washington Conference"; the other is entitled "Additional Ships permitted by Treaty to be laid down before 31st December, 1936." The former Table, which we will call "A," shows the *actual* construction that has been undertaken or approved: the latter Table, which we will call "P," displays the *possible* building which may yet be embarked on. If these two Tables are merged into one, then we get a conspectus of the whole range of construction throughout the full course of the two Naval Treaties:

II.—*WARSHIP CONSTRUCTION* 1922–34/6 *BY THE FIVE GREAT NAVAL POWERS.*[1]

Category:	*Britain.*[2]		*U.S.A.*		*Japan.*		*France.*		*Italy.*	
	A.	P.	A.	P.	A.	P.	A.	P.	A.	P.
Capital Ships	2		—		—		2	4	2	5
Aircraft Carriers	1	1	3	1	3		–	2	–	3
Cruisers "A"	15		18		12		7		7	
Cruisers "B"	17	8	7	2	10		12		12	
Destroyers	72	30	46	51	77	1	59	*	48	*
Submarines	37	5	16	24	47		83		54	
Totals	144	44	90	78	149	1	163		123	
	188		168		150					

A = Actual Naval Construction 1922–34. P = Possible Future Construction 1934–6.

[1] Extracted from U.S. *Comparative Strength of Navies.*
[2] Includes Dominion Navies.
* France and Italy are not limited in these categories.

Aircraft Carriers.—Totals do not include: in "A" columns conversion of vessels into aircraft carriers, or in "P" columns replacement ships for experimental vessels.

Destroyers.—Include in "A" column lost "Miyuki" and "Sawarabi" (Japan).

Submarines.—Include in "A" columns lost "Poseidon" (Britain), "Promethée" and "Ondine" (France).

It will be seen that Japan has built, is building, and has planned to build every new ship she can lawfully acquire under the Naval Treaties. The solitary destroyer she has not made provision for is a vessel unexpectedly required as a replacement of the lost "Miyuki." Japan has done no more than exercise her rights to the full, but her action in pressing her permissible construction to the extreme limit has had its effect on the other side of the Pacific. The United States have expressed their determination to possess a navy which, like the Japanese, shall be built up to the last ounce permitted by the Treaties. Of the 90 U.S. ships totalled above, 67 are now building, or have been assigned to contractors and Navy Yards for construction. The President has power to ask Congress to approve most, if not all, of the other 87 ships and vote funds for their building. The irony of it: from Washington, in 1921, came the call for the reduction of naval armaments; yet the nearer the Washington Naval Treaty draws to its end, the more prolific is the American production of naval armaments!

These American figures seem to show that we have not much further to go in the attainment of our own "Treaty-limit" Navy; but, even if we do get that Navy by the end of 1936, it will have to incorporate a considerable number of over-age and unreplaced cruisers and destroyers.

Modernization of Capital Ships.

The six capital ships embodied in the above Table as built or begun since 1922, are the "Nelson," "Rodney" (Britain); "Dunkerque," "Strasbourg" (France); and the "Vittorio Veneto," "Littorio" (Italy). On these ships we will not comment, for the simple reason that everything is known about the first four, and little or nothing about the last two.

Statistics dealing with naval construction during the Treaty Period 1922–1936 ignore one very important matter with regard to capital ships, and that is the subject of "modernization." We can adopt and adapt Johnson's epitaph of Goldsmith, and say of "modernization" that there are few capital ships which it has failed to touch, and whichever it has touched it has not failed to adorn—at a cost! Out of the

52 capital ships now possessed by the five Sea Powers, there are only three—the " Nelson," " Rodney," and " Hood "—for which elaborate plans of reconstruction have not been prepared or carried out. The cost of " modernization " runs from three-quarters of a million to three million pounds per ship treated, and the total outlay by the five great navies on this class of work since 1922 must now surpass fifty millions. Yet it had to be so: the Washington Treaty enjoined a " holiday " in the building of new capital ships, a vacation which the London Treaty prolonged. The inevitable result was that nations had to do what they could, by costly tinkering, to adapt their capital ships of pre-War design to meet post-War conditions.

The Washington Treaty did allow the addition of 3,000 tons of defensive material to existing capital ships, to give them better defence against aerial and underwater attack. It looks a lot, but it is none too much. The " bulging " of a battleship may absorb 1,100 tons, and the remaining 1,900 tons may have to go to the provision of a 6-inch anti-bomb deck. From the new edition of *Jane's Fighting Ships*[1] it appears that the three U.S. battleships of the " New Mexico " class have each received the permitted 3,000 tons of extra protective material in the course of their extensive (and expensive) reconstructions. And despite this added burden these ships are reported to be faster now than they were before. A higher speed, notwithstanding a heavier displacement, means a considerable increase in driving power; and, in all probability, these American battleships have received new and much more powerful machinery. The truth is that, in displacement, armament, speed, cruising endurance, protection, and in nearly every other respect, the three rebuilt U.S. battleships of the " New Mexico " class are now the equals of our " Nelson " and " Rodney."

Still more extraordinary is the transformation of the Italian battleships " Conte di Cavour " and " Giulio Cesare." We still lack exact details of their reconstruction, but from the indications given in *Fighting Ships* it would appear to be on these lines :—

	Tons.	*H.P.*	*Speed.*	*Armament.*
As built 1910–15 .	21,711*	31,000	=22 kts.	13–12″; 18–4.7″; 16–3″
As rebuilt 1933–35	25,000	60,000	=26 kts.	10–12″; 24–3.9″; A.A.

In other words, two semi-obsolete capital ships of pre-War design are being converted into two fast battleships or battle cruisers of post-War pattern. If the alterations to the two " Cavours " prove successful, the other two old Italian battleships, " Andrea Doria " and " Caio Duilio,"

[1] See " Reviews of Books," p. 214.

* Average Standard Displacement.

will be treated in the same way. The Italian battle fleet of the future may therefore be composed of six battle cruisers—two " Littorio " class and four rebuilt " Dorias " and " Cavours " ; whilst on the French side there will be two new battle cruisers—" Dunkerque " and " Strasbourg," and six old 20-knot battleships.

Fighting Ships also shows us that the Brazilian " Minas Geraes " is being " modernized " on a lavish scale, but we can hardly grudge her rejuvenation, seeing that, after twenty-five years of service, she has become the world's senior " Dreadnought " battleship.

Aircraft Carriers and Catapults.

The latest completed aircraft carrier to appear in the pages of *Fighting Ships* is the U.S.S. " Ranger," a vessel of 14,500 tons with accommodation for 76 aircraft. According to published information, our " Glorious " is about 20 feet longer than the " Ranger " and 8,000 tons heavier, but carries about 24 less aircraft.[1] It is sometimes asked, why do the U.S. aircraft carriers carry a far greater number of planes than our ships do ? There are various ways of accounting for the difference, and amongst them allowance must be made for the wide variation between the two navies in the matter of stowing aircraft in carriers. Our practice is to keep the aircraft under cover in the hangar, and to move them, by lifts, to the flight deck for flying operations. In the U.S. Navy, the hangar deck is only used for repair work, and no attempt is made to keep the planes stowed there. In brief, the American aircraft carrier carries her aircraft *on* her flight deck ; the British aircraft carrier carries hers *under* it. When not required for flying operations, the U.S. aircraft are simply " parked " out on the open flight deck, with their engines and cockpits covered over, and

" . . . are firmly secured to the deck by means of special forms of eyebolts which are placed in small wells in the deck. These eyebolts are scattered so thickly that one can always find plenty of them, no matter where the plane is to be secured. A line is run to each wing, one to the tail-skid and one to the propeller-hub. In addition, battens are secured to all the controls to prevent them from moving about in the wind." [2]

The U.S. aircraft carriers, with their huge loads of aircraft, packed as

[1] See Table appearing on p. 6 of " Aircraft Carriers," by Sir Arthur W. Johns, K.C.B., C.B.E., Director of Naval Construction, Admiralty. (Read before the Institution of Naval Architects, March 21st, 1934.)

[2] " The Airplane Carrier," by Lieutenant H. B. Miller, U.S.N. (Read before the American Society of Mechanical Engineers, 1932.)

tight as sardines in a tin on their flight decks, make a very impressive exhibition, but experience has proved that aircraft stowed out in the open deteriorate much more rapidly than those kept under cover in a hangar.

There is another great divergence between the British and U.S. navies, and it is in the matter of catapult equipment and aircraft embarked in ships other than aircraft carriers. How great the difference is may be appreciated from the following statement, in which the figures on the American side have been mostly derived from the U.S. publication *Comparative Strength of Navies*:

BRITISH NAVY.	C.	A.E.	*U.S. NAVY.*	C.	A.E.
15 Capital Ships (*a*) .	5	6	15 Capital Ships .	25	45
5 Aircraft Carriers .	–	138	4 Aircraft Carriers .	2	234 (*e*)
1 Seaplane Carrier (*b*) .	–	5	14 Heavy Cruisers .	28	56
19 Cruisers, " A " (*c*) .	13	14	10 Light Cruisers .	20	20
31 Cruisers, " B " (*d*) .	5	6		75	355
	23	169			

C. = Catapults. A.E. = Aircraft embarked.

(*a*) The five British capital ships fitted with catapults (one each) are: " Ramillies," " Barham," " Renown," " Royal Sovereign," Valiant."

(*b*) Is " Albatross " (R.A.N.).

(*c*) Of the 19 " A " cruisers, the following are fitted with one catapult each: 5 " Kents "; 4 " Londons "; 2 " Norfolks "; " York." " Exeter " has two catapults.

(*d*) Of the 31 " B " cruisers, 4 of " Leander " class and " Emerald " have one catapult each.

(*e*) According to U.S. " Naval Directory," this is the total now carried by the 4 U.S. aircraft carriers.

NOTE.—Of the 43 U.S. ships above, 34 have two catapults, 7 have one, and 2 have none. Of the 71 British ships, 1 has two catapults, 22 have one, and 48 have none.

Figures are lacking as to the number of catapults and aircraft to be carried in ships now building or authorized, so the position at the end of 1936 cannot be definitely forecast. A rough and very tentative estimate shows that the situation, about two years hence, may be: British Navy—45 catapults and 275 aircraft embarked; U.S. navy—

100 catapults and 600 aircraft embarked. Sufficient has been said to show that, in naval aviation, the United States has a present and prospective advantage of more than two to one over us. The principle of " parity " between the two navies, so fundamental a point in the Washington and London Naval Treaties, is certainly not being observed here !

CRUISERS.

Since 1922, the five Sea Powers have built or begun 59 cruisers armed with 8-inch guns, all of them, save six, being of the 10,000-ton size. (It has been said that these vessels form a fitting memorial to the politicians who negotiated the Limitation Treaties !) Only three vessels of this category are now in hand—the American " Quincy," " Vincennes," and " Wicheta." They are said to constitute a new class and, amongst 8-inch gun cruisers, to be " the very last word." It is hoped that this will prove to be the case ! Looking broadly at the successive foreign designs for these big cruisers, it is interesting to observe how the first fine enthusiasm for guns and speed was later tempered by a prudent desire for more protection.

During the " Treaty Period " of 1922–1934, 58 cruisers armed with 6-inch (and lesser) guns have been completed, commenced, or contracted for. They form a variegated lot, and range in size from 5,000 to 10,000 tons ; in armament from four to fifteen 6-inch guns ; and (except for the French " Jeanne d'Arc ") in speed from 30 to 40 knots. We have three types of 6-inch gun cruisers now under construction—the " Southamptons," " Amphions," and " Arethusas," of, respectively, 9,000, 7,000 and 5,200 tons. From the details, plans, and illustrations in the new edition of *Fighting Ships* the first and third types are derivations from the second, in the same way as the armoured cruisers of the old " Drake " and " Monmouth " classes were respectively enlargements and reductions of the " Cressy " class.

The " Southamptons " are to mount twelve 6-inch guns in four triples, as against eight such guns mounted in four twin positions in the " Amphions." Twelve 6-inch do not constitute the heaviest battery of such weapons ever mounted in a British cruiser. One of the plans considered (and rejected) by the Board of Admiralty in 1898 for the " Improved Cressies " (" Drake " class) provided for a main armament composed solely of twenty 6-inch guns. The 11,000-ton " Andromedas " and " Ariadnes " carried sixteen 6-inch, and the 9,800-ton " Monmouths " fourteen.

The " Southamptons " are about 30 feet longer than the " Amphions," and they require this extra length to accommodate the

larger triple 6-inch gun turrets. Amidships there will be about the same space available for boilers and machinery in the " Southamptons " as there is in the " Amphions." It would therefore appear that both types will be powered on the same basis, namely with machinery of 72,000 h.p. It is estimated as sufficient to drive the 7,000-ton " Leanders " and " Amphions " at a maximum speed of 32.5 knots; but the yield from the same power in the heavier 9,000-ton " Southamptons " will probably be only 31 knots. If this assumption is correct, then we can construct the following comparison :—

No.	*Class.*	*Nationality.*	*Displacement.* (tons).	*Speed.* (knots).	*Armament* Main.	A.A.	T.T.
6	" Mogami "	Japan	8,500[1]	33.0	15–6.1″ :	8–5″ :	12
7	" Brooklyn "	U.S.A.	10,000	32.5	15–6″ :	?–5″ :	?
5	" Southampton "	British	9,000	31.0 ?	12–6″ :	4–4″ :	8

It looks as if we had spoilt our ships for a ha'porth of tar : another thousand tons of displacement would have given us a type every whit as good as the two foreign ones. But the " ha'porth of tar," in the way of extra tonnage, we could not afford : the residue of tonnage at our command, under the terms of the London Treaty, for new cruiser construction was so small we had to adopt a design that was, on paper, a little inferior to the contemporary foreign productions.

The French " Emil Bertin " was the outstanding cruiser success of 1934, for a surplus of 8,000 h.p. over her designed power produced an increase of nearly six knots over her anticipated full speed. She is a cruiser-minelayer of 5,886 tons, but her armament of nine 6.1″ and four 3.5″ A.A. guns, and six torpedo tubes make it quite obvious that she is more cruiser than minelayer. The Italian " A," " B," " C " and " D " classes of cruisers have not changed in main armament (8–6″), in designed speed (37 knots) or in their general scheme of protection, but the displacement has risen from 5,000 to 6,800 tons. " Structural strength more approaching our own standards " is the explanation advanced in the Preface to the new edition of *Fighting Ships* for the steadily rising displacements in the successive groups of Italian 6-inch gun cruisers.

Leaders and Destroyers.

In flotilla leaders and destroyers our showing,[2] of 72 vessels built, completing, or projected during the past thirteen years, looks quite

[1] May actually be 9,500 tons.

[2] See Table II, p. 95.

creditable, but amongst those 72 are eight ships, completed in 1922–25, which were simply the belated relics of our war programmes. In size, gun-power, and speed we have nothing comparable with the 26 super-leaders France has built since 1922. However, " all is not gold that glitters " ; a heavy armament and a phenomenal rate of travel are not the only attributes that go to make a good destroyer type. Our policy has been the production of a standard type, based on the well-tried " V " and " W " classes of the War days, and those who have served in British destroyers of post-War creation know what splendid ships they are for seaworthiness, habitability, cruising endurance, and equipment.

Submarines.

The London Treaty has one good work to its credit, if it has no others : it severely deprecated the building of monster submarines, of which it would not allow any Signatory Power to possess more than three. Submarine-construction for the five Great Navies, during the past thirteen years, has tended towards the production of three patterns : (*a*) an " ocean patrol " type of about 1,300 to 1,800 tons, (*b*) a " smaller patrol " type of about 570–670 tons, and (*c*) special mine-laying boats. France's activity since 1922 in this branch of naval construction has been remarkable, for in the production of new submarines she has outbuilt us at the rate of more than two to one.

A Summary.

What has been the effect of the two Limitation Treaties on naval design in general ? The imposition of limits in displacements naturally led to an intensive quest for economy of weights. The regulations regarding the largest permissible gun calibres have also had their effect, and led to an increase in gun lengths, in elevation, in rates of fire, in improved ballistics, and so forth.

The Washington and London Naval Treaties have not produced any new type of capital ship. Admittedly our " Nelson " and " Rodney " were built after the Washington Treaty was signed ; but those two ships embody principles of design which were decided upon before that Treaty was negotiated. The virtual suspension of all new capital ship construction for a period of fourteen years has led the five Sea Powers into immensely costly schemes of reconstruction work, so that the lives of their existing battleships and battle cruisers might be prolonged.

The Washington Treaty allowed the conversion of certain unfinished capital ships into aircraft carriers. When the costly work of transformation had been completed, some of these ships were found to demand

vast sums for their annual maintenance. The warships *converted* into aircraft carriers range in size from 22,450 to 40,000 tons.[1] The latest vessels *designed* as aircraft carriers vary in size from 7,100 to 20,000 tons. Does not this show that the converted ships have proved extravagantly large for the work they had to do?

But the prime product of the Limitation Treaties has been the creation of two peculiar types of 10,000-ton cruisers, one armed with six to ten 8-inch guns, and the other with twelve to fifteen 6-inch guns. It was Japan who initiated the building of both these types of large cruisers.

The French "super leaders" are not derived from the Naval Treaties, for France had decided to build the first ships of this species in 1921, before the Washington Treaty was discussed. By refusing to sign Part III of the London Treaty, she has been at liberty to develop and perfect this type of fighting vessel. It is therefore a type which has not originated from or been influenced by any of the Treaty regulations. These 26 magnificent ships form a most remarkable illustration of what a nation can do when left unfettered and untrammelled, in the development of a particular type of fighting ship, designed and built to suit the needs of its naval defence.

As for submarines, it may be remarked that, in the last stages of the War, Germany was building "ocean patrol" and "smaller patrol" types of submarines, and special mine-laying boats, which did not vary much in characteristics from the types of submarines built by the Sea Powers under the Limitation Treaties. In the past thirteen years there have been advance in design, perfection of detail and equipment, and improvement in Diesel engines; but there has been no radically new type.

When we regard the expensive "modernizations" of old capital ships, the costly conversions of unfinished ones into aircraft carriers of extravagant size and maintenance cost, and the creation of over sixty 10,000-ton cruisers, costing two million pounds and more apiece, one begins to wonder if the Limitation Treaties have not added to the "burden of armaments" instead of lessening it.

The 1935 Naval Conference is going to give us a "New Deal" in naval armaments. For the sake of our own security and peace of mind, let us hope that it will be a good deal better deal than the deals we got at Washington and London in 1922 and 1930.

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[1] The U.S. carriers "Lexington" and "Saratoga" ran their "standardization trials" at displacements a little over and under 40,000 tons.

THE FUNCTIONS OF TANKS

By Major J. K. Edwards, M.C., Scots Guards.

THE tank is neither a new nor an untried weapon, but it has so developed in mobility, endurance and fire power as to bear little resemblance to the vehicle which led the attack over the German trenches at Cambrai in the autumn of 1917. Accordingly there have grown up two schools of thought with regard to their employment in war. First, there are those who favour independent tank action unrestricted by close co-operation with the less mobile arms; secondly, those who contend that the primary role of the tank still lies in the close support of infantry to assist the latter by fire and shock action against machine guns. As is to be expected when enthusiasts argue from opposing points of view, the issue is often obscured by exaggeration and over-statement.

In order to analyse these conflicting arguments it is necessary to refer to the history of the tank, though in so doing it is difficult to avoid a few platitudes. The dominating factor of the Great War was the power of the defence and the impotence of the attack, both due to the devastating effect of the fire of concealed machine guns in defence, particularly when combined with the use of barbed wire. The development of weapons and the trend of tactics revolved round this problem. It built up the legend of the invincibility of the defence, and caused the stagnation which resulted in the piling up of material, to avoid the effects of which the opposing forces went to ground and dug enormous trench systems. In a justifiable attempt to provide the infantry soldier with every conceivable form of weapon and contrivance to aid him in his contest with the machine gun, we loaded him up until he became a beast of burden and bore more in proportion to his weight than we allow a horse to carry.

This eclipse of the infantry soldier from his proper function in a modern army was particularly unfortunate, because, as a result, he is still held up to ridicule by some advanced thinkers of the new arms who remember his evil plight in the Great War and are probably ignorant of the characteristics in course of development for the future.

Prior to the autumn of 1917 a ponderous measure of success in attack had been achieved by the great barrages on the Somme and before Ypres. But surprise was impossible to achieve by this means;

the ground was so cut up that the fruits of success could not be gathered before the enemy, long forewarned of the attack, could stabilize his front. Then came the tanks. At once surprise became possible; wire could be crushed, and machine guns destroyed by fire or shock action. The limited speed of this war-time tank facilitated its close co-operation with infantry. The moral effect was enormous and played no small part in successful tank attacks.

When peace training commenced it was realized that at the outset of war no nation could or would produce the material with which belligerents ended the last war. Perhaps for less valid reasons it was, and still is, assumed that highly organized trench and wire systems will be the exception rather than the rule. At once there grew a tendency for faster and lighter tanks. Endurance and mobility became their principal characteristics while intercommunication and fire control was perfected. In a word, tanks became increasingly intricate and expensive, while their crews grew more and more to be mechanical experts. These developments militated against successful co-operation with infantry. The timing of infantry and tank attacks became increasingly difficult. Tanks travel to their objectives at 15, infantry at 1½ miles an hour. If the infantry starting line is 3,000 yards from the objective and tanks are to give "cover" during the last 2,000 yards of the infantry advance, the tanks must be on the objective 40 minutes before the infantry arrive, during which period they will be fully exposed to anti-tank weapons whilst unable to exploit their mobility. Again, owing to their cost the number of tanks available must be strictly limited. A tank battalion in co-operation with infantry is said to advance over a front of 1,500 yards. This barely covers the front of one infantry battalion, and enemy opposition outside the limits of the tank attack will be free to concentrate on attacking infantry.

In considering these facts it cannot be wondered that officers of the Royal Tank Corps—and the tendency is not limited to these officers—are regarding close co-operation with infantry attacks with increasing impatience, and are turning their thoughts to operations in which tank formations manœuvre on Salisbury Plain like battle squadrons at sea, as well as independent attacks against enemy gun lines and headquarters, and other such attractive possibilities.

The arguments of this school of thought cannot be lightly dismissed. It is urged that it is uneconomical to employ a vehicle, the costs of production of which are so high, with a radius of endurance of nearly a hundred miles and a speed of 15 miles an hour, in supporting infantry attacks over a few thousand yards of ground which may be unsuitable terrain for tanks. Further, it is argued that such attacks will often

be made against the strongest portion of the enemy's line and that surprise, which the tanks by reason of their mobility are able to achieve, will be prejudiced by the preparations for the infantry attack. The difficulties of timing tank and infantry attacks have been referred to: it is said that they must result in tanks being exposed to anti-tank weapons for long periods when they are unable to exploit their mobility. Lastly it is argued that the maximum assistance can be given to infantry attacks by the operations of tanks that have broken through the front elsewhere and so attacked enemy gun lines and nerve centres. This form of co-operation, it is claimed, will allow the tanks to exploit their special characteristics, while the moral effect of their penetration behind the enemy's lines will produce the necessary support to the attacking infantry with the minimum of cost—to the tanks.

Those who hold opposite views also produce attractive arguments. They admit that the increasing mobility and endurance of tanks entitles them to inclusion in armoured formations designed for operations in which these assets can be exploited. They are not in the least inclined to minimize the potentialities of tanks employed with armoured and mechanized units in independent missions. At the same time they are convinced that infantry will still be required to attack and capture defended positions in war. To do so with the slightest prospect of success the infantry require an antidote to the concealed machine guns which nearly all armies now possess in greater numbers than in the Great War.

The War proved that tanks are *par excellence* the weapon for dealing with this form of opposition. Without tanks the prospects of attacking organized positions are only slightly more favourable than they were in 1914 and 1915. Our artillery strength is practically the same. We have a large increase in machine guns, but these close-grouping weapons are at a great disadvantage in the attack since, for the attainment of effective results, it is essential to locate the target. They are entirely unsuitable for " plastering " an area. The supply of mortars provides infantry with a close support weapon of great value. But it is in the nature of a palliative. It cannot be claimed that the unsuccessful attacks in the early days of the War on the Marne and the Aisne, or again during " the race to the sea," would have succeeded any better had four trench mortars been available in each battalion. If therefore, it is said, tank attacks in close co-operation with infantry are to be " exceptional," what is to replace the tank? What assurance is there that there will be no repetition of the disastrously expensive ill-supported attacks against organized positions so common in the early days of the War.

The material assistance rendered to attacking infantry by independent tank attacks on other portions of the front should be very greatly discounted. Tanks are no longer the novelty they were in the War, when their moral effect was often decisive. The fighting determination of German machine gunners on the Somme after they had been subjected to the most intense bombardment ever produced in war shows the degree of resistance to be expected from first-class infantry. It is most unlikely that the morale of such troops will collapse in consequence of the problematical peregrinations of tanks in the neighbourhood of the enemy's corps or divisional headquarters—of which threats, moreover, the front-line infantry must often remain blissfully ignorant. Again, it is stressed by the sceptics that the tank experts are unjustifiably optimistic of the success of this admittedly untried form of independent tank attack. Tanks thus employed will be fighting in unreconnoitred country under conditions in which they must operate with closed visors, because the enemy's nerve centres and gun lines may be concealed and protected by anti-tank weapons and obstacles.

Since in defence the enemy will usually have no other task for his own tanks, our vehicles will be subjected to tank counter-attacks in strange surroundings on ground probably familiar to the enemy. Under these circumstances the prospects of decisive success will be doubtful.

To summarize the conflicting points of view. It must be admitted that modern light and medium tanks have developed far beyond the stage of close co-operation with infantry attacks. To restrict existing and future tanks to this role is to sacrifice their most potent battle qualities, while the temptation to fritter them away in piecemeal attacks may prove irresistible owing to the desire to save infantry casualties. On the other hand, we must be equally reasonable and admit that there is no shred of evidence to suggest that in war, in our time at least, infantry will not be required to attack and capture defended positions as the principal means of obtaining tactical success. It is equally evident that to launch infantry against this type of opposition with insufficient support will result in heavy loss in men and morale and will reduce the confidence of the national leaders at home in military leadership ; a feature so noticeable in the last War.

With our existing scale of artillery, and short of employing tanks, there can be little doubt that we lack the means to provide adequate support for infantry attacks against organized defences. To speak of unorganized, or semi-organized defences in operations against an enemy armed and equipped on a European standard is the height of foolish optimism. Why should they be unorganized or semi-organized ? What would be the fate of a commander in peace training who, when permitted twelve hours of daylight to occupy a position, was subsequently

found to have omitted to organize a co-ordinated fire plan, or to construct preliminary cover? We all know that, owing to the delaying power of protective detachments, the necessary time for completing defensive preparations will not be difficult to obtain. Wire, the effect of which is almost ignored in our peace training, exists in abundance in nearly all European countries. It follows that, without an enormous and uneconomical increase in artillery, some form of tank support must be regarded as the normal rather than exceptional accompaniment of infantry attacks against organized positions. It does not follow, because invention has evolved a tank with costs of production and fighting efficiency far beyond the requirements of an infantry support tank, that we require a new doctrine regarding the role of tanks in war. But it must be realized that, like guns, or aircraft, tanks have many varied tasks to perform, for each of which organization and design must be suitably adapted.

The requirements of an infantry support tank are low cost of production, fair cross-country mobility, and a good machine-gun platform with a small crew. Endurance must remain a secondary consideration.

In attack the role of these vehicles is that of providing the maximum support for infantry, by seeking out and destroying hostile machine guns, and crushing wire. In defence, they will form a mobile reserve of fire power, and will be available to support counter-attacks. The provision of an infantry tank battalion within the division will release existing medium and light tanks for what now must be accepted as their proper role. This is clearly co-operation with other mobile troops or inclusion in armoured formations; or "break through" tasks when the crust of the enemy position has been penetrated, exploitation beyond the enemy's lines, and pursuit. Against semi-civilized enemies, their action will be directed against the hostile flank or rear, with or without the co-operation of other mobile troops. Perhaps such formations may prove the genesis of the imperial striking force of the future.

Evidence that the need for an infantry tank has been recognized is provided by recent official pronouncements. It is to be hoped that circumstances will permit early incorporation of "I" tank battalions within divisions, because the development of this weapon will be anxiously watched by the infantry arm. Progress may be difficult because funds are limited and the impetus of enthusiasm inseparable from the more spectacular tank formations is less likely to be connected with the more prosaic infantry tank. Tank experts, however, would do well to concentrate attention on this vehicle. Inadequate provision of "I" tanks in war will result in misuse of tank formations by commanders who will have no alternative if infantry casualties are to be saved.

CYCLIST UNITS

By CAPTAIN R. L. K. ALLEN, *p.s.c.*, The Royal Welch Fusiliers.

PREVIOUS to and during the Great War there was a manual known as *Cyclist Training;* the last edition appeared in 1917, when the Army Cyclist Corps existed. The conclusion to be drawn from its perusal is that cyclist units can be of the greatest value in mobile operations. Yet in recent editions of *Field Service Regulations and Cavalry Training* no reference whatsoever is made to the tactical employment of cyclists, although the necessity of the infantry division being strong in mounted troops has been recognized by increasing the divisional cavalry from one squadron to one regiment. In fact the cyclist company, formerly part of the divisional mounted troops, has been entirely eliminated.

Under the present system of tactics much is required of divisional cavalry, which is expected to carry out duties involving long marches, fighting to secure a position or to cover a withdrawal, and holding a position until late at night; while finally it may be ordered to carry out similar operations commencing well before dawn next day. No proper rest can thus be assured for men or horses—an uneconomical employment of the mounted arm which can lead to grave loss of efficiency. Now, if cyclists existed to relieve cavalry of certain duties, the latter would better be able to carry out their more legitimate tasks, and the division, with its component parts, would be given greater opportunity to manœuvre for the attainment of its object.

In a country where average roads and tracks exist cyclists are very mobile. Over a good surface it is possible for them to maintain an average speed of ten miles an hour during eight to ten hours a day. It is, moreover, not necessary for numerous roads to exist, as in certain types of country and under good weather conditions, the bicycle can be ridden across country, while obstacles such as hedges and ditches are not insurmountable. Both by day and night cyclists can move noiselessly by road. At night their road speed is about seven miles an hour. In addition, cyclists have a distinct advantage over cavalry when required to act dismounted, because their machines can be left lying on the ground, and the problem of feeding and watering horses

does not arise. The supply and maintenance of a cyclist unit is, in fact, easy. The supply system is the same as that of an infantry unit; it requires no forage. Punctures, if they occur, can be rapidly repaired, and in cases of emergency a bicycle can be ridden, without much inconvenience, on a flat tyre.[1]

The cyclist is not faced with the difficult problem which the cavalryman experiences in securing concealment from the air, especially when halted. He also offers a lesser target to small arms than the horseman, and he is less vulnerable owing to the rapid variation of speed at which he can travel.

Before and During the War.

Prior to 1914 fourteen Territorial Force battalions were mounted on bicycles. No Regular cyclist units existed. Provision, however, had been made for the formation of a divisional cyclist company for each regular division: the company to consist of six platoons with a total establishment of 7 officers and 208 other ranks. It was to form part of the divisional mounted troops.

The battalions within each division found the troops for the cyclist company; and, in some cases, these men were specially trained in reconnaissance work. This method gave no training to the cyclists to act as a unit, nor did it legislate for any special equipment. It also mixed in one unit men from a large number of battalions, and placed them under officers who also very probably had no training in their special duties, and certainly lacked experience in handling a formed body of cyclists. Nevertheless the divisional cyclist companies with the B.E.F. in France did valuable work during the retreat from Mons and the advance to the Aisne. But whenever they gained a local success, such as securing a bridgehead or surprising an enemy's flank, their numbers were so small that no important results could be achieved. As conditions became more stabilized opportunities for the use of mounted troops of any kind disappeared, and until 1918 they could only be used as a mobile reserve.

The formation of the Army Cyclist Corps in the summer of 1915 is evidence of the fact that the potential possibilities of cyclists had been recognized. Then during the spring of 1916 divisions gave up their mounted troops, control of the latter passing to corps. The mounted troops of each corps included a cyclist battalion of three companies, with a total strength of 500.

[1] The recent invention of the "Sorbo" puncture-proof tyres may eliminate this disadvantage.

Whenever conditions permitted, corps mounted troops carried out training which would teach them to cover the advance of the infantry into open country behind the enemy's line, and to hold ground until the slower infantry came up to consolidate its occupation. In the advance of 1918 the cavalry and cyclists were successfully employed in the roles for which they had thus been trained and organized.

Organization in Foreign Armies.

On the outbreak of the War in 1914 each French cavalry division had a cyclist group of over 300 men in its establishment. The present-day organization of the " Division Legère " includes a cyclist group of 450 men. In addition to this group the division also possesses a cyclist field troop of engineers.

The German pre-War establishment gave to each *Jäger* and *Schützen* battalion a cyclist company of a little over 100 men. By the end of 1916 the Germans had formed cyclist battalions and brigades, and they maintained this organization until the end of the War. No regular cyclist units now appear to exist in the German Army, but the police force, which has military equipment, carries out its training to a considerable extent on bicycles.

Like the French, the Belgians have retained the bicycle for mounting a part of their army. The Army Corps cavalry regiment has one reserve group of three cyclist squadrons, while a divisional cavalry regiment includes a reserve cyclist group of three squadrons.

Holland and Switzerland, the two countries which were on the flanks of the opposing Powers on the Western Front, also retain cyclist units in their present army organizations.

Tactical Value.

A commander of a formation of troops supplied with cavalry, in his endeavour to secure his power of manœuvre, is often inclined to overwork his body of cavalry. But the commander must consider the fact that " the power which cavalry possess, by reason of their mobility, of intervening at the critical moment of an action, must not be squandered by their employment on operations of a secondary importance." [1] Cyclists are of great value in relieving cavalry of " operations of secondary importance " no less than the other arms; for this reason alone they seem to justify their existence. Provided the ground is fairly open with a firm surface, such as may be found

[1] *Cavalry Training*, Vol. II, Sec. 12 (1).

on Salisbury Plain and in many parts of India, cyclists can be used to supplement cavalry on reconnaissance duties. They are much more suitable than cavalry for a reconnaissance of a village or a wood. For the seizure and occupation of a position, especially in enclosed country, cyclists might even be of more value than cavalry. The latter, owing to the nature of the country, are often confined to roads, on which their pace is half that of cyclists, while on arrival at their objective they are unable to employ their full strength in holding what they have seized owing to the drain of men for horse-holding. In protective duties, moreover, the possession of cyclists should prove of yet greater assistance; in the approach march they can act as advanced guard mounted troops; they can reconnoitre side roads and tracks, and block approaches open to armoured vehicles or other similar troops designing to attack the main body. On a night march their capacity to move silently, to dismount and take cover quickly, make them eminently more suitable than horsemen for reconnaissance. In rearguard fighting cyclists can move rapidly from one delaying point to another. They can also be usefully employed for ambushes. When flank guards are necessary they can take up successive flanking positions from which to cover a march. Both by day and night standing patrols can be furnished by cyclists on outpost duty, or when in defence, and they can be sent out considerable distances for observation duties. Should a river or canal crossing have to be effected, with no bridges available for the purpose, the employment of cyclists should be most profitable. The men can cross by wading or swimming, and pass their machines over by the use of an "endless rope." They are thus better able to negotiate certain types of river than cavalry.

During battle cyclists may provide a commander with a mobile reserve, with which he can exploit a success in attack, reinforce a threatened point, or launch an immediate counter-attack. Their ability to move at speed and then to fight as infantry would give the commander a small force either to outflank the opposition or to cause a diversion.

It may be argued that it is not necessary to have a specially trained arm to carry out many of the tasks mentioned, as there now exists quite an efficient organization for making infantry mobile by the use of buses or lorries. But motor vehicles are vulnerable both from the air and the ground; they are noisy, and their use is restricted by the condition of roads or tracks. They are also far more susceptible to road blocks. They have no manœuvring power, and the troops carried cannot dismount quickly in order to fight. They fall easy victims to an ambush. In addition mechanical vehicles, apart from requiring

petrol, oil and spare parts, are liable to breakdown, while their availability cannot always be guaranteed. In comparison to embussed infantry, the cyclists, who can find their own protection, seem peculiarly well adapted for covering shorter distances close to the enemy at speed.

Co-operation with Other Arms.

In addition to direct assistance or support in the carrying out of protective and reconnaissance tasks, they would also be in the position to effect the early relief of cavalry, thus enabling the latter to off-saddle and rest, a matter of special importance at night. Economy must be exercised in the use of cavalry just as much as in the use of tanks. Should our Army be faced with a " major war " it is doubtful if there are now sufficient suitable horses available in Britain for the full expansion of the cavalry arm. An economy in cavalry can be effected by employing cyclists as mounted troops.

Not only in direct co-operation with cavalry would cyclists be of value in working with other arms of the Service. They could provide an intermediate link between tanks seizing an objective and the arrival of the infantry to take over the objective gained, thus avoiding the possibility of tanks remaining on or near the objective and becoming targets for hostile anti-tank guns and artillery. Armoured cars could be followed up and relieved from stationary tasks, such as holding a bridgehead or communication centres. The availability of cyclists would diminish the tendency to overwork armoured cars or to use them uneconomically. Cyclists could also be used to provide artillery escorts and for the protection of advanced landing grounds.

The sea transport of cyclists is a simple matter. They can be conveyed, with their machines, in virtually the same tonnage as infantry, no horse space or water or forage facilities being necessary. On landing, cyclists could be quickly put ashore and pushed inland to secure a covering position. Should the landing be opposed, they, with their machines, can still accompany the first " wave " and form a mobile reserve ready for instant action. Cyclists should therefore be available for immediate employment with any expeditionary force, as they provide reconnaissance and mobile troops which are so easy to put ashore.

Training and Organization.

Time is always required for training, and, if it is considered desirable to have cyclist units at all, they must be capable of making the best use of the mobility conferred upon them, and be able to carry out the many special duties which are outside the scope of the ordinary infantry

soldier. Furthermore, commanders, staff officers and officers who may be in command of cyclists require practice in handling cyclist units and studying their employment.

It is essential, therefore, that cyclists should be formed into units and trained in peace time. The cyclist must be cycling fit, have an eye for " cycling country," possess the ability to handle his machine under all conditions, understand the special roles he may be called upon to carry out and, finally, be able to execute minor repairs unaided. Training in co-operation with other arms is of the utmost importance.

Men trained as cyclists can be used as infantry at any time, but men trained solely as infantry are not necessarily fit for employment as cyclists. A man may be an excellent marcher, yet he may be a poor cyclist, and conversely a good cyclist can be weak in marching power. But cycling ability will not hinder a man's ability to fight on foot ; it will, in fact, enhance his value in that respect, as he will be much fresher on arrival at the scene of action. For, besides the advantage of being able to move at four times the pace of infantry, cycling is much less fatiguing than marching.

Neither is it advisable to rely upon the formation of the cyclist unit within the brigade, since the withdrawal of men from battalions for this purpose can never be really satisfactory. Battalions also cannot afford a further loss in their bayonet strength, while the officer problem must create difficulties. It is suggested that an infantry brigade should consist of three infantry battalions and one cyclist unit. Since it is undesirable to create new corps or to revive old ones, certain infantry units would thus need to be converted into the required cyclist units, while maintaining their traditions and county connections. The cyclist unit in an infantry brigade would be known as a cyclist battalion, although its strength would be less than that of an infantry battalion.

Enlistment would then be direct into a cyclist regiment. On the expiration of his colour service the man would become a cyclist reservist. The Territorial Army would also enlist men direct into cyclist units ; only one battalion in each Territorial brigade would be composed of cyclists. The Supplementary Reserve might possibly be so organized as to permit of the formation of extra cyclist units on mobilization.

The supply of officers may possibly present difficulties, for the average officer prefers to use a motor-car and is not an enthusiastic cyclist. However, officers in cyclist regiments, whose appointments correspond to mounted officers in an infantry battalion, should be provided with chargers, just as officers of cavalry regiments which have been converted into armoured car regiments retain their horses.

The O.T.Cs should also maintain a cyclist platoon or section in their college or school contingents.

It is not anticipated that great difficulty would be encountered in the supply of officers for Territorial Army units, or any Supplementary Reserve units, since so many civilians still use a bicycle in their daily life.

The only additional cost accruing to the country out of the formation of a cyclist battalion would be that of supplying the bicycles. But this cost of converting one infantry battalion in every four into a cyclist battalion need call for no rise in the Army Estimates. Owing to their functions, moreover, the establishment of a cyclist unit should be less than that of an infantry unit, and the extra cost of the latter would be met from the savings made in pay, rations and allowances.

The supply of machines to the Territorial Army or to the Supplementary Reserve should be a simple matter. The personnel of these units might be allowed to use their own private machines, provided they fulfilled certain not too stringent specifications, and be granted an allowance in accordance with the usage made of their machines on military service.

Conclusion.

Complete mechanization of our Army is impossible, even if it were desirable. But in spite of partial mechanization the infantry, which is still the main body of an army, appears to be in great danger of losing the mobility and manœuvre power it once possessed. This is due to the accuracy and power of modern weapons, and to the infantry's inability to counteract their effect by speed of movement. The inclusion of a body of efficiently trained cyclists within an infantry brigade would give that formation an arm for manœuvre. Cyclists proved their value in the mobile operations of the Great War, while Continental nations appreciate their utility. Cyclist units are inexpensive to maintain in comparison with other mobile arms, and there exists an ample reserve of personnel and machines within the country. But in order that the full benefit of the cyclist's capacity for manœuvre may be obtained in war, training in the employment of cyclist units is essential in peace. The inclusion of cyclists in Regular units of the Army therefore seems justifiable and necessary.

AVIATION IN THE SOVIET UNION

By Flying-Officer F. P. R. Dunworth, R.A.F.O.

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THE Union of Soviet Socialist Republics extends, roughly, from the eastern boundaries of Scandinavia, the Baltic Sea, Rumania, and Turkey across Asia to the Behring Sea and Pacific Ocean. The northern boundaries are the Arctic Sea, while along its southern border are Turkey, Persia, Afghanistan, Mongolia and Manchuria. The area thus covered totals 8,241,673 square miles, 1,492,000 of which lie in Europe. Generally, with the exception of the long range of the Ural Mountains, the country is flat towards the North and Central Areas, and mountainous towards the South. There is a population of 168,000,000, of which 108,100,000 inhabit Europe. More than 80 per cent. of the population is rural, although factories are rapidly being built all over the country, with a consequent increase in the mechanic class. Moscow, the capital, has a population of 3,570,000.

Aviation began in Russia in 1910, and by 1912 several Russian aeroplanes had been constructed and flown, including the first four-engined passenger-carrying cabin machine, designed by M. Sikorsky, who is now designing aircraft in America. The War, however, completely disorganized Russian aviation, so that, after the Revolution, a fresh start had to be made right from the very beginning. Air units had practically ceased to exist, and there were no factories, repair shops, or aeronautical establishments in working order. One of the first measures then taken was the opening of the Central Aero-Hydrodynamical Institute in Moscow in 1918; in the same year a special aeronautical commission was set up. The beginning of a long aeronautical alliance with Germany in 1922 saw the Junkers company open a factory at Fili, near Moscow. Three hundred Fokker aircraft were purchased from residue stocks in Great Britain, France, and Italy. With these machines, including the D.H.9a, flying training was carried out, and many of their prototypes are still being used. Aircraft and engine factories were built, and work began under German and occa-

sional American supervision. A scheme was laid down under the first Five-Year Plan giving each factory a production figure to which it was expected to adhere. Although it was generally reported that production fell below the figures laid down, the Soviet authorities claimed that the first Five-Year Plan was completed in four years by 1932, and, accordingly, embarked on another Five-Year Production Plan to be completed in 1937.

The Political and International Outlook.

All Soviet enterprises are greatly influenced by political considerations, and there is no doubt that the Soviet authorities were fully aware from the first of the importance of aviation to the country as a whole, not only for internal communications but as a military force. Since then they have been steadily working, with increasingly rapid results, to make their air forces as strong numerically as any in the world. It is difficult to quote numbers with accuracy, as reliable information under this heading is not easy to obtain, but, as will be seen later on, certain reasonable assumptions may be made showing that the Soviet air forces have been strengthened at a rate unequalled—not attempted even—by any other great Power.

The disadvantages of being dependent on foreign sources of supply have always been present in the minds of the Soviet aviation chiefs, whose aim has been to create a self-contained aeronautical unit. They are now approaching this aim at remarkable speed, though this does not mean that they are not more than ready to keep in touch with all international developments in aviation. At first, they were almost entirely dependent on Germany; lately, for various reasons, German influence has waned, and most foreign governments are now taking an active interest in Soviet aviation. Many indications of this change in foreign aeronautical relations have been manifest of late. In 1932, Turkish military squadrons visited Moscow, and a reciprocal visit was paid to Stambul. In the same year, a French delegation, under M. Pierre Cot, a former Minister for Air, made a tour of the aviation industry in the U.S.S.R. and returned full of enthusiasm for the success obtained and the manner in which Soviet aviation had rehabilitated itself. Last year a Soviet bombing squadron, at the invitation of various governments, visited several continental Powers; a trade commission was sent to Britain, its aeronautical members showing keen interest in the aircraft taking part in the Royal Air Force Display at Hendon. Later, British and American air attachés were appointed to Moscow, while Soviet military and air attachés arrived in London and Washington.

Other Powers had already received such representatives of the U.S.S.R. It is now reported that the United States desire to establish closer liaison with the U.S.S.R. by sending about thirty pilots each year to introduce into Soviet military aviation any new American developments, and that military chiefs from each country will be present at each others' air manœuvres, while reciprocal visits by aircraft to U.S.S.R. and the United States will be made. It is also reported that the Soviet mission recently visiting Paris signed a contract for the construction of Hispano-Suiza 12 YBR engines in Soviet factories, and that an order for twenty-five Gnôme-Rhône K.14 engines was given out. It is anticipated that negotiations for the construction of these engines under licence in the U.S.S.R. will shortly be concluded.

Military Command and Administration.

The U.S.S.R. defence forces are placed under a single command, controlling the Army, Navy, and Air Force. Supreme authority is vested in the People's Commissariat for the Defence of the Union, which is responsible through the Council for Labour and Defence and the Council of People's Commissaries to the Central Executive Committee of the Union. There is no line of demarcation as we know it in this country between military and civil aviation, but there is appointed a People's Commissary to whom are subordinated a Military Air Force Administration and a Chief Inspectorate of Civil Aviation.

The whole country is divided into eleven military areas to which air forces are attached in varying strengths according to the needs of the moment. The military areas are as follows :—

Area.	*Capital.*
Moscow.	Moscow.
Leningrad.	Leningrad.
Ukraine.	Kharkov.
Northern Caucasus.	Rostov.
White Russia.	Smolensk.
Volga.	Samara.
Central Asia.	Tashkent.
Siberia.	Novosibirsk.
Army of the Red Flag of the Caucasus.	Tiflis.
Special Army of the Far East.	—
Cossack Military Commissariat.	Alma Ata.

At the head of each area is a Revolutionary Military Council presided

over by the officer commanding the military forces and to which the chief of the air force of the district is responsible.

The Union of Osoaviachim Societies.

This association was formed in 1933 by the fusion of the Society of Friends of Aviation, the Society for the Encouragement of Aviation and of the Chemical Industry, and the Society for the Encouragement of National Defence. It is an association peculiar to the U.S.S.R. and its activities are manifold, embracing both civil and military aviation. It co-operates in the defence of the Union and develops those industries which are most important and indispensable from economic and technical points of view, particularly aeronautical and chemical industries. It undertakes all questions of aeronautical propaganda, and, to this end, its incorporated societies possess aeroplanes, gliders, and balloons, which are used for flights in the Union and abroad, competitions, and propaganda tours.

Other departments of the association deal with developments in aviation, economics, air administration and training. It organizes aviation circles (or clubs) for the encouragement of air-mindedness, and controls model aircraft circles, aeroplane and airship flying and navigation circles, technical circles, and aeronautical workshops. It also builds sporting and commercial aircraft, which are dealt with later in this article.

The Osoaviachim organization co-operates with the Red Army in the defence of the country, and, as its name indicates, is primarily concerned with defence against air attack, although military instruction of all descriptions is given to its members, while it undertakes military instruction of reservists. The air defences are said to be very well organized; detailed instructions are given in the use of bombproof shelters, gas-masks, etc., and precautions against incendiary bombs are available for use at a moment's notice. In fact, in this "passive" protection of the civil population against air attack, the U.S.S.R. have, like Germany, gone a long way: other countries are now following their lead. The Osoaviachim members numbered over 12,000,000 in 1932, and it is reasonable to suppose that this figure has increased with the progress of Soviet aviatoin during the last two years. The society has collected large sums of money from its members, and has presented many military aircraft to the Red Army.

Civil Aviation.

Civil aviation is controlled, organized, and developed by the government organizations known as the Chief Inspectorate of Civil Aviation.

It is the supreme authority on the subject, but is responsible to the People's Commissariat for the Defence of the Union. It is primarily concerned with co-ordinating the air lines and at the moment is concentrating on improving the regularity of the main air services and instituting smaller lines in the Ukraine, Urals and Northern Caucasus for the purpose of linking up local centres. There are air services to all parts of the country, but only the more important lines, such as the " Deruluft " and the Moscow–Irkutsk service, run to any definite schedule. These are known as first-class lines and run as follows :—

The " Deruluft " lines (Soviet-German Company) maintain regular service from Moscow to Berlin via Riga, Königsberg, or Leningrad, Tallin and Riga.

The All-Union Combine of Civil Aviation runs from Moscow in all directions—to Leningrad, Tiflis, Tashkent, Irkutsk and thence to Vladivostok. It is difficult to assess the total length of air lines as understood by commercial undertakings in other parts of the world, since, for the most part, services are run when required. It would be entirely uneconomical to maintain regular lines to those parts of the country as yet industrially undeveloped, and, although there are aerodromes and landing grounds connecting all parts of the U.S.S.R., it would not be accurate to say that such provision for aerial travel constitutes an air line. However, under the second Five-Year Plan, a programme was laid down, a feature of which was the reorganization of the principal Trans-Soviet air routes from Moscow to the Caucasus, Moscow to Central Asia, and Moscow to the Far East. Day and night services are to be instituted, working on a planned schedule to avoid delay where a change of aircraft is necessary ; generally, all lines will be speeded up. Under this organization, it is hoped to complete the distance from Moscow to Tiflis (1,900 miles) and Moscow to Tashkent (1,920 miles) within twenty-four hours, and the journey from Moscow to Irkutsk (2,900 miles) within forty hours. To realize these plans, it has been necessary to make considerable improvements in the equipment of aerodromes along the routes, and to introduce light signals and all radio accessories so necessary to the modern commercial pilot.

Civil aviation has made great progress in the last few years. In 1922 the " Deruluft " line was the only non-military aircraft service in the country, but by 1932 the Soviet had prepared for the working of aircraft over 30,000 miles of air routes, had carried 35,000 passengers and large quantities of freight and mail. The plans for the next few years include air services over 62,500 miles, and although, as already suggested, figures are rather misleading to those accustomed to regarding an air line as a *regular* undertaking, it will be seen that at the present

rate of progress civil aviation in the U.S.S.R. must sooner or later take its place with the largest in the world. The great drawback is the general lack of technicians. This is being overcome as far as possible by foreign instruction, but until the U.S.S.R. can produce engineers and designers of quality, and in sufficient quantities, they will largely be dependent on foreign aircraft industries. The principal civil air ports are to be found at Moscow, Kasan, Sverdlovsk, Omsk, Novosibirsk, Irkutsk, Kharkov, Rostov, Mineralny Wody, Tiflis, Baku, Tchardjni, Tashkent, Stalinabad, Alma Ata, Semipalatinsk, Termez, Tashaus, Khabarovsk, Nicolaevsk, Werchnendinsk, Archangelsk, Penza, Orenburg, Kazalmsk, Smolensk, and Leningrad. There are in addition a number of second-class air ports, aerodromes, landing grounds, while others are being constructed all over the U.S.S.R.

Aircraft Production and Types.

The experimental and research establishments in the U.S.S.R. are responsible for the design, development, and construction of new aircraft types, and the successful type thus developed is put into production at the aircraft factories. The chief of these experimental establishments is the Central Aero-Hydrodynamical Institute in Moscow. The construction of military aircraft and equipment is controlled by the Military Aircraft Trust, while a Civil Aircraft Trust exercises a similar control over civil aircraft production. There are aircraft, aero-engine and accessory factories, repair shops, experimental and designing plants at work to-day, chief of these being in Moscow, Kharkov, and Fili (6 km. from Moscow)—the most modern aeroplane plant in the country, Leningrad, Taganrog (on the Sea of Azov and an important source of supply for South Russia), Voronesk, Rybinsk, and Zaporozhie. Under the industrial plans laid down, production figures are expected to increase considerably, as many of these factories have been improved and additional equipment installed. The factory at Fili, for example, which was formerly the Soviet branch of the German Junkers firm, has been greatly enlarged and future plans call for still further increase in size. It is hoped to build up to an annual output of 1,500 metal civil and military aeroplanes.

All types of aircraft are under construction. The details of the performances of some of the later types are of interest, especially when compared with aircraft of other countries. The performance figures are not official, but there is little reason to doubt their veracity.

The *I*.6 is a single-seater biplane fighter with an M.15 nine-cylinder air-cooled engine of 515–625 h.p., and capable of a top speed of 208 m.p.h. at 16,400 feet.

The *R.5* is a two-seater reconnaissance biplane with an M.17 water-cooled V engine of 650 h.p. Maximum speed, 153 m.p.h.

The *T.B.2* is a multi-seater heavy bombing sesquiplane with 650 h.p. M.17 engines capable of 134 m.p.h.

The *D.I.3* is a two-seater fighter biplane with one M.17 engine. Top speed, 170 m.p.h. at 16,400 feet.

The *M.D.R.2* is a long-distance reconnaissance flying boat with two M.17 engines fitted with pusher airscrews, and capable of a speed of 135 m.p.h.

The *A.N.T.9* is a product of the Central Aero-Hydrodynamical Institute, whose chief engineer is A. N. Toupolov, by whose initials this and many other Soviet types are named. The A.N.T.9 is a three-engined cabin monoplane powered with Gnôme-Rhône " Titan " air-cooled radial engines, one in the nose and one on either side of the fuselage. There is room for nine passengers with baggage, and the machine has a maximum speed of 130 m.p.h. with a range of 558 miles.

The *A.N.T.14* is a thirty-six-passenger monoplane with five 480 h.p. Jupiter 9AKK air-cooled radial engines, giving a maximum speed of 136 m.p.h.

The *A.N.T.20* is the famous " Maxim Gorky " all-metal monoplane, built on the lines of the A.N.T.14, but fitted with eight 780–850 M.34 engines. It was designed as a propaganda machine, accommodation being provided for a crew of twenty-three with forty passengers. It carries a printing press and photographic laboratory for the preparation of leaflets and news sheets, wireless transmitting plant, cinema apparatus, electrical slogan equipment, etc. All passenger cabins contain four sleeping bunks. The overall span is 210 feet, and it is said to have a top speed of 170 m.p.h. with an air range of 1,500 miles. For ordinary passenger work, the A.N.T.20 can be fitted to carry sixty to seventy passengers.

The *AIR.5*, constructed by the Osoaviachim Society, is a four-seater cabin monoplane with one Wright " Whirlwind J.4B " radial air-cooled engine of 200 h.p. It has a maximum speed of 118 m.p.h.

The *Kalinin K.5* is a ten-seater monoplane with a 450 h.p. M.15 nine-cylinder radial air-cooled engine.

The *Stal.2* is the result of a successful attempt to construct a spot-welded stainless tube and sheet steel aeroplane by the Scientific Research Institute of the Red Army. It is a single-engined five-seater cabin monoplane with a maximum speed of 127 m.p.h.

Apart from these more modern types, there are many of the old

DH.9a and Junker types still in use for training, as well as some other German types built under licence.

Airships.

The success of the German " Graf Zeppelin," which has paid many visits to the U.S.S.R., has set the Soviet air authorities to work on an ambitious programme of airship construction. They obtained the services of General Umberto Nobile, the Italian designer, after the Italian government had abandoned the development of lighter-than-air craft, and airships of his design have been produced. The programme calls for more ships of this type ; two have recently been completed and made trial flights. They are of semi-rigid construction, and it was proposed to use them as an experiment in mail and passenger carrying on a regular air service between Moscow and the Urals. An all-metal airship is under construction, designed by Tsiolovsky. It is being built of stainless steel, with which metal the Soviet aircraft designers have already experimented in the Stal.2 aeroplane, and details of which were exhibited at the Paris Aero Show, 1934. It is still too early to judge the success or otherwise of Soviet airship construction.

Adaptations, Experiments, and Records.

Soviet aviation has been employed in co-operation with industry with excellent results. The possibilities of using aeroplanes for spraying pestilent areas with chemicals have been realized, and much has been done in this way to render habitable many large mosquito-infested areas of land. The vast agricultural districts also effectively use the aeroplane to sow their crops ; in a rural country of the size of the U.S.S.R. the labour-saving qualities of this method will be appreciated. The crops thus raised are protected from destructive pests by the spraying of appropriate solutions from the air.

The other uses to which aviation lends itself are forest fire protection, aerial survey, and work in connection with the enormous fishing areas off the Soviet coasts.

Experiments on a large scale are being made with an " aerial train." Two large passenger-carrying gliders are towed behind a high-powered commercial aircraft to various aerodromes from Moscow, and the success of these trials has encouraged the Soviet air authorities to carry out further experiments on these lines. They anticipate being able to cast off these towed gliders over their appropriate aerodromes when the pilot in charge of the glider would bring it safely down. Such a method would obviate intermediate landings by the aeroplane, and has the

advantage that a glider can land on a smaller aerodrome than that required by a large passenger machine.

In the matter of aeronautical records, the chief claim of the Soviet is the height reached by the scientific balloon flight to the stratosphere which ended fatally for the three scientists involved. Their instruments, however, were salvaged, indicating that a height of 67,570 feet had been attained.

Recent Soviet reports announced that the closed circuit record held by Rossi and Boussoutrot of 6,625 miles has been broken by the Soviet aviator, Gromay, who raised the record to 7,656 miles. This has not yet been confirmed.

Conclusion.

In this brief review of Soviet aviation it is impossible to cover all the ground very fully, and many details, figures, etc., have been omitted where official figures have not been available. The main point of interest which remains to be dealt with is the question of the actual strength of the Soviet Air Force. Many varying figures have been put forward, and a close examination of all available evidence indicates that the Soviet Air Force is the largest in the world, probably over four times as large as the British Royal Air Force: this means a first-line aircraft strength of over 3,000. Many continental authorities support this view, while pointing out that the U.S.S.R. is not resting on recent progress, but is still increasing its air strength. This view is further supported by the fact that M. Voroshilov, the Defence Commissary, was hoping for a 200 per cent. increase on the 1931 total, which was then given as 750 first-line aircraft. In personnel a similar increase has taken place, and, including commanding and subordinate ranks, the Soviet Air Force must be over 50,000 strong. In addition to these figures, it must be taken into consideration that many large industrial organizations are training and equipping military forces which would be called out in defence of the Union.

That the Soviet are conscious of their air strength may be judged by the words of M. Kuibuishev, the Assistant Chairman of the Soviet of People's Commissaries, when speaking at the celebrations of the rescue by aircraft of the "Chelyuskin" arctic expedition in March and April, 1934: "The rescue of the Chelyuskinites showed that at any moment our entire country will rise to the defence when it is needed, and that it can provide many, many heroes. The rescue proved to what degree we can rely on our own forces, on the technique which has grown up in our country, and to what degree we have mastered that technique."

There remains the question of the extent to which the U.S.S.R. is

prepared for war. Observations made by those visiting the U.S.S.R. seem to indicate that, while the Soviet has no wish at present to be involved in any European trouble, it is watching with some apprehension the activities of the Japanese in the Far East. Many new aerodromes are being built there, and a large proportion of military aircraft, heavy bombers especially, are stationed in positions to offer reprisals to any attacks emanating from that quarter. The Soviet, of course, possesses a potentially greater air striking force than Japan, and this, coupled with the fact that the United States are establishing friendly relations with the U.S.S.R., may have the necessary quietening effect on the Far Eastern situation.

Aviation has been received with enthusiasm in the U.S.S.R. Aviation days are now regular occurrences in the larger towns, and parachuting, gliding, and ballooning, as well as the aeroplane, all have their many adherents. Massed parachute jumps are a feature of these aviation days, while a proposal to train a million young people in the art of gliding by the end of the year has been put forward. As gliding is but a preliminary to other flying, it will be seen that there is not likely to be a shortage of pilots in the future.

Such, then, is the position. From being a negligible aeronautical force only ten years ago, the Soviet has built up its aviation into one of the most flourishing in the world. It represents a huge effort on the part of the authorities concerned, and an effort that is by no means spent.

THE DEVELOPMENT OF THE SUBMARINE

By Captain C. B. Barry, D.S.O., R.N.

On Wednesday, January 23rd, 1935.

Admiral of the Fleet Sir Roger J. B. Keyes, Bt., G.C.B., K.C.V.O., C.M.G., D.S.O., D.C.L., LL.D., M.P., in the Chair.

The Chairman, introducing the Lecturer, said: "Captain Barry joined the Submarine Service in January, 1914, when I was Commodore in charge of it. Two years later he was appointed to his first command, and he has actually commanded submarines for seventeen years. He received the D.S.O. in 1918 for distinguished service in action with enemy submarines; he has taken a submarine from England to Australia; and he is now Chief of the Staff to the Rear-Admiral in Command of the Submarine Service.

"When I was in command of the Mediterranean Fleet, he was captain of the 'K.26'—the last of our steam-driven submarines, which were in fact diving destroyers. On one occasion I was on board her when she was steaming 23½ knots; the order was given to dive, and in 3 minutes 20 seconds he dived her to 100 feet. I think you will agree that he is well qualified to talk to us about submarines."

LECTURE

IT is generally assumed that the submarine is a modern invention, but in actual fact it is nothing of the sort. The earliest records show that the ancient Greeks and the Egyptians produced vessels in which men were able to descend below the surface of the sea. No details of these craft are available, but it is generally agreed that they were of the nature of a diving bell.

That was some 400 or 500 years B.C.; then there came an interval of about 2,000 years before any further record of attempts at submarine navigation. In 1620, a Dutchman named Van Drebbel produced a submersible vessel on the Thames at London. It had a hull of leather stretched over wooden frames and was propelled by two oars using the "Ulo" method. Van Drebbel is reported to have carried a bottle of magic liquid from which he let fall a drop when he wished to dive or come up. Actually there was no magic in the business at all; diving and surfacing were carried out by filling or emptying a number of goat skins which had their mouths sewn over holes in the hull of the submarine. The body of each bag projected inside the submarine and when on the surface was flattened between two boards in the form of a clamp. In order to dive the clamps were eased back and the bags filled with water. To come up again, the water was expelled from the

bags by closing the clamps. It was really a very simple and practical method of working a submarine. King James I is reported to have made a trip in this vessel from Westminster to Greenwich, but that is not authenticated.

Encouraged by Van Drebbel's success, others took to experimenting with submarine vessels, and from that date onwards many strange craft were produced. Among these was one with a wooden hull built by an Englishman named Day. He laid many wagers that he would dive to a depth of a hundred yards and remain there for twenty-four hours. He won his wagers without any difficulty, but unfortunately he never came up to claim his winnings!

The first attempt to use a submarine in war was in 1773 during the War of American Independence. The Americans had no fleet capable of standing up to the British, but an ingenious doctor named Bushnell produced a submarine known as the " American Turtle " and claimed that with it he could destroy all the British ships which were anchored off New York. His submarine had an egg-shaped hull large enough to accommodate one man in a sitting position. It was provided with two hand-worked screw propellers—one for moving horizontally and the other for moving vertically. There was a ballast tank for submerging the vessel, fitted with a pump for discharging the water and also a safety weight which could be released in emergency. The armament consisted of a powder charge in a watertight case attached to the outside of the submarine. It was also secured by a lanyard to a large screw which projected above the top of the vessel, and which could be turned and freed from the inside. The method of attack was for the submarine to dive under its victim and then discharge water so that the submarine came up against the bottom of the ship. The man inside would then wind his screw into the bottom of the ship until it was free of the submarine; at the same time he released the case containing the powder charge. The act of releasing the case started a clockwork mechanism which in a few minutes fired the charge; the man had those few minutes in which to get his craft away.

An attack was carried out in 1776 on the British frigate " Eagle," which was anchored off New York. The submarine was manœuvred into position under the " Eagle," but the man inside, although he tried in two different places, could not get the screw through the copper sheathing. The submarine drifted away on the tide and, being chased by some soldiers in a boat, released her charge in the middle of the British ships, who were so scared by the explosion that they all shifted berth to Sandy Hook. The attack having failed, however, the Americans

gave Bushnell no further encouragement, so he retired from the business.

The next development of interest came during the Napoleonic Wars when another American—Fulton by name—invented a submarine which he first offered to the French Government. This looked more like the modern conception of a submarine as it was cigar-shaped. It was provided with sails on a collapsible mast for use on the surface, and a screw propeller worked by two men for use submerged. Its armament consisted of an explosive charge which it towed, and the method of attack was to dive under the target and hope the charge would strike the hull of the ship and explode. Actually Fulton blew up a hulk at a demonstration he gave at Cherbourg, and he claimed that, given a sufficient number of these submarines, he would bring England to terms by destroying all the shipping in the Thames and so starve London. This idea did not appeal to the French and one of their Admirals is reported to have said, " Thank God France still fights her battles on the surface." It is interesting to see how that sentiment has changed: France now has the largest submarine fleet in the world.

Finding the French would have nothing to do with him, Fulton came to England, where William Pitt was then Chancellor. Pitt quickly realized that Fulton's invention was likely to prove more of a danger to England than a benefit. He accordingly bought the patent rights and paid Fulton £15,000 to return to America on the understanding that he gave up any further experiments with submarines. Nevertheless, other people went on experimenting, but there was a long period of peace which gave no opportunity to try out submarines under war conditions until the American Civil War in 1864. A Frenchman produced a submersible for the Confederates known as the " David "; it did not actually dive but proceeded awash. Three of these were built. The first two were not successful and drowned their crews of eight men during trials; the third, armed with a spar torpedo—an explosive charge on the end of a spar fixed to the bow of the vessel—attacked the Federal warship, " Housatonic." The officer of the watch said afterwards that he saw what appeared to be a wooden plank approaching the ship, and when it touched there was a terrific explosion and the ship sank. It is hardly necessary to add that the attacker sank too, but the incident is noteworthy as being the first successful attack carried out by a submarine.

Up to this time one of the greatest difficulties of the submarine designer was that he had to rely on man power to propel the vessel, at any rate when submerged, and further there was no suitable weapon for a submarine. But the latter part of the XIXth century saw a great

advance in all things mechanical and electrical, and the submarine developed very rapidly during that period. At first steam and compressed air engines were tried in submarines. They were followed by internal combustion engines, and electric motors driven by storage batteries. The final solution to the problem was electric motors driven by storage batteries for use when submerged, and internal combustion engines for use on the surface, although steam engines continued to be used until quite recently in special cases. The problem of a suitable weapon was solved by the development of the locomotive torpedo, which allowed the submarine a reasonable chance of destroying the enemy without herself being destroyed.

Even then the development of the submarine was practically left in the hands of private individuals, such as Lake and Holland in America; Nordenfeldt in Sweden; Laubeuf and Gustave Zedé in France, and Laurenti in Italy. The Governments of the world only became interested when someone produced a submarine which promised to give good results, and it was not until the end of the century that these craft began to take their place in the fleets of the world. France and America were the first to adopt them. The former took up the design of Laubeuf, which was a double-hull submarine; the latter employed that of Holland, which was a single hull type.

Great Britain was reluctant to embark on a submarine programme, and in April, 1900, Viscount Goschen made the following statement in the House of Commons:—

"Close attention has been given by the Admiralty to the subject of submarine boats. The submarine boat, even if the practical difficulties attending its use can be overcome, would seem, so far as the immediate future is concerned, to be eventually a weapon for maritime Powers on the defensive, and it is natural that those nations which anticipate holding that position should endeavour to develop it. The question of the best way of meeting its attack is receiving much consideration, and it is in this direction that practical suggestions should be valuable. It seems certain that the reply to this weapon must be looked for in other directions than in building submarine boats ourselves, for it is clear that one submarine boat cannot fight another."

Lord Goschen's forecast that submarines would be powerful weapons for a nation on the defensive has since been amply borne out by history.

FIRST BRITISH SUBMARINES.

Ultimately the British Admiralty decided that we could no longer afford to ignore this new type of warship and, in December 1900, five submarines of the Holland type were ordered from Vickers and were

laid down at Barrow-in-Furness. Messrs. Vickers had previously built two submarines, one of the Nordenfeldt type for Turkey, and a steam-driven one for Russia.

Germany favoured the French double-hull design, but did not build any submarines for her fleet until 1905.

In those early days, that is to say in the beginning of the present century, a submarine was nothing more than a very small vessel capable of proceeding under water. They were not able to make long sea passages or to remain at sea for more than a day or so, and were really only suitable for defence of bases. The submarine crews of those days certainly earned every penny of the extra pay they received. The material and machinery was very crude compared with what we expect now, and our pioneer submarine officers and men had many difficulties to contend with. For instance, the early periscopes had very poor vision and, to add to the difficulties of the captain of a submarine, when he trained the periscope on the beam the horizon appeared vertical; when he looked astern the horizon became horizontal again, but the sea was on top and any ships in sight appeared to be hanging downwards from the horizon. It was with one of these periscopes that Lieutenant Fiellman in an " A " class submarine made an attack on a small submarine tender off Alverstoke Beach. It was and still is customary in peace time for the ship being attacked to fly a red flag. On this occasion the tender was between the submarine and the beach and Fiellman was struggling to get a view of his target. Suddenly he saw what he thought was the red flag carried by the target ship, so he manœuvred his submarine to fire a torpedo and when his sights came on he fired. Unfortunately the " red flag " was, in fact, a very large red parasol under which the wife of a retired Colonel was sitting on the beach. Fiellman made a perfect shot, and the torpedo hit the beach and ran up alongside the terrified lady, who suffered severely from the shock. The Colonel subsequently sued the Admiralty for damages.

In those days, too, whenever a Holland boat or an " A " boat fired a torpedo the only possible way to prevent the bow of the submarine rising and breaking surface was for the two largest stokers to double smartly forward at the moment of firing carrying a heavy tool chest. If they ran fast enough and did not drop their heavy burden *en route*, their combined weight might act in time to keep the bow down and prevent the submarine breaking surface.

However, development continued to be very rapid in all directions, and by 1910 some really efficient types of submarines were being produced by all the principal naval Powers. To give some idea of the progress made—the British Holland class displaced 105 tons; they

were 63 feet long ; they could steam 500 miles on the surface at 8 knots ; they were armed with one 18 inch torpedo tube and one torpedo ; and they carried a crew of 2 officers and 7 men.

The " E " class, which were being built in 1911, displaced 650 tons ; they were 180 feet long ; they could steam 2,600 miles at 12 knots on the surface ; they were armed with four torpedo tubes, and eight 18 inch torpedoes ; and they carried a crew of 3 officers and 28 men. In addition there had been a great improvement in the machinery in general, batteries, periscopes, and sea-worthiness. One of the greatest advances was the substitution of Diesel or heavy oil engines for the petrol engines. Petrol is not a pleasant thing to live with. In addition to its being highly inflammable and explosive, it gives off a vapour which is heavier than air, extremely poisonous, and difficult to detect. This gas was liable to hang about just above the deck inside the submarine, and any man who lay down to rest would soon suffer ill-effects. That was why white mice were carried in submarines in the early days. They lived in cages on the deck and their job was to give warning of the presence of petrol vapour by dying. I was once in command of a petrol-driven " C " class submarine in the War, and we were doing a short passage from Dover to Harwich. The engine developed a serious petrol leak, and one by one the engine-room complement became affected by petrol poisoning. It had most peculiar effects : some men became fighting drunk, others weeping drunk, and others just maudlin. Eventually the whole of my engine-room complement was so drunk on petrol that we could move no further, and had to be taken in tow by a destroyer.

By the outbreak of war in 1914 Great Britain possessed 18 effective submarines of the " D " and " E " classes out of a total of 74, the remainder being of the " A," " B " and " C " classes, which were small petrol-driven craft suitable only for local defence. Germany possessed a total of about 20 effective submarines. They displaced from 500 to 600 tons ; were armed with 4 torpedo tubes and a gun ; had a surface endurance of from 2,000 to 3,000 miles, and were driven by Diesel engines. These larger vessels were known as " patrol " submarines and it is this type that still forms the main part of the submarine fleet of any nation.

GREAT WAR TYPES.

However, during the War there was a demand for submarines to perform special functions, and this called for the development of special types—such as " minelaying," " anti-submarine " and " fleet " submarines, in addition to the patrol type. It may be of interest to describe briefly how the demand for these various types arose.

At the start of the War, Great Britian at once instituted submarine patrols in the Heligoland Bight to watch, report, and attack the German fleet. These patrols were maintained by the " D " and " E " class submarines based on Harwich and Yarmouth, while the smaller submarines were employed on local defence patrols off our coasts. When more " patrol " submarines became available additional bases were established at Blyth and in the Tees. These submarines maintained patrols in the Kattegat, Skaggerak, and off the West coast of Denmark, so as to cover all the possible exits of the German fleet. By then, too, the enemy had laid so many mines in the Heligoland Bight that our submarines had to move further out ; more patrols were therefore required to cover the exits. At the same time the Commander-in-Chief of the Grand Fleet felt he would like some submarines to be available to co-operate with the Fleet in the event of a general action. Therefore the arrangement was that some of the submarines at Blyth and the Tees should be available to rendezvous with the Grand Fleet when required in the position where it was anticipated the action might take place, or to take up patrol positions on the line of retreat of the German High Seas Fleet. Eventually, however, it was realized that this was an unsatisfactory arrangement and that the only way in which the Commander-in-Chief could rely on having submarines present at a fleet action would be to take them with him. This called for a type capable of keeping up with the Fleet at sea under all normal conditions, which brought about the production of the " K " class. These vessels displaced 1,800 tons on the surface, and had a maximum surface speed of 24 knots ; they were driven by oil-fired boilers and steam turbines, as that was then the only practical method of obtaining the necessary power. Unfortunately, none of them were completed in time to take part in the battle of Jutland, and after that there was no further opportunity of trying them out in action.

The sudden and rapid development of these " Ks " was a wonderful achievement, and was largely due to the genius of Sir Arthur Johns, the present Director of Naval Construction at the Admiralty.

The next type we developed was the minelaying submarine. The Germans had laid extensive minefields in the Heliogoland Bight, leaving clear channels for their ships. It was out of the question to send surface minelayers to mine these channels, but there was no reason why a submarine should not dive in and do so—if she could carry the mines. Actually we adapted a number of patrol submarines to carry mines, and they were regularly employed in mining the German swept channels. A large number of submarines were required for this work because their losses were very heavy, which is not really surprising when one considers

that they operated in narrow channels between minefields whose limits were not accurately known; even if they had been, there were no aids to navigation.

Later in the War we developed a special type of anti-submarine submarine. When the German submarine war against shipping started we began to employ our patrol submarines on anti-submarine patrols. These were established on the routes followed by the U-boats when proceeding to and from their areas of operation and also in the areas where the U-boats operated. It was, however, realized that a small and handy submarine with a high underwater speed was best suited for attack on other submarines, and accordingly a special type displacing about 400 tons was designed. They had a submerged speed of 14 knots[1] and were armed with six 18 inch torpedo tubes in the bows. This underwater speed was a very great advance on anything that had been previously attained—the normal full speed submerged hitherto had been about 8 knots. There was considerable speculation as to what would happen when an "R" boat went full speed for the first time—some thought they would dive uncontrolled to the bottom and stick in the mud, never to rise again, but the really gloomy prophets said that the torque at full power submerged would be such that the propeller would gradually come to rest and the submarine would revolve around it. I happened to command the first "R" class to go full speed under water, and I must say I felt a trifle nervous. However, my craft turned out to be a "perfect lady" when submerged, and our only trouble was we went so fast that we soon got miles away from our escort and were sighted by a bloodthirsty American destroyer which promptly attacked us.

OPERATIONS.

Many were the activities of our submarines during the War, but two of the most outstanding successes were their operations in the Baltic, and in the Sea of Marmora during the Dardanelles campaign.

Several "E" class submarines made the perilous passage through the Sound into the Baltic, and remained there, based upon Russian ports. They preyed upon the German communications with Sweden, and "E.1" succeeded in frustrating the German expedition to Riga by torpedoing the battle cruiser "Moltke," which caused the whole expedition to turn back. They remained in Russia until the revolution when the crews blew them up before returning to England.

In the Dardanelles our submarines succeeded in paralysing the lines of supply by sea of the Turkish Army on the Peninsula, which forced them to send their supplies by land. As their land communications

[1] Their surface speed was only 8 knots.

were most primitive this handicapped them greatly. "E" class submarines were used for these operations; they had been designed to remain at sea for about a fortnight at a time, yet "E.11" managed to remain for 42 days at a stretch in the Sea of Marmora.

The adventures and achievements of our submarines in the Sea of Marmora and the story of how on each occasion of making the passage through the Dardanelles they had to penetrate the enemy minefield and two lines of nets, are matters of history, as is the achievement of "E.11" in having actually penetrated into the Golden Horn, the harbour of Constantinople. I think, however, that a short description of the latter adventure, kindly given to me by Captain D'Oyley-Hughes, R.N., who was First Lieutenant of "E.11," may be of interest. This is his account :—

"We dived into the harbour on a windless day with a glassy surface which did not help periscope work. The crew were asleep except for those actually on watch. Nothing of any note occurred until we arrived just short of the entrance to the Bosphorus when we sighted a large merchant ship loading up alongside the Arsenal ahead of us. We could then clearly see the Sultan's palace on the starboard bow and Galata bridge to port of us.

We fired two bow torpedoes at the ship alongside the Arsenal, one of which hit and sank her, but we did not know this. The other torpedo was our one failure in 51 war shots. It did not blow out its tail plug at once and therefore the gyro capsized. Nasmith[1] saw it floundering round our periscope and thought the Turks were controlling a Brenan torpedo and that we had better go deep.

At this moment our bows must have got into the strong tide rushing out of the Bosphorus for, as we went deep, we spun round in an amazing way, the compasses went to hell and we didn't know which way we were pointing. We struck the bottom at 200 feet and then heeled over violently and bumped up and up and up until only 29 feet were on the diving gauge. We made her very heavy and stayed at this depth, and stopped to consider the situation.

Depth charges now began, but none very close.

Now Brown, our 3rd hand, woke up and got out of his bunk, saying he was sure that we had bumped on the starboard side of the ship and therefore must be on the starboard side of the channel. We reversed the helm and screws and this pushed us gradually into deeper water, proving that he was right and we were wrong. After a few minutes we found ourselves still on the bottom at about 150 feet.

[1] Now Vice-Admiral Sir M. E. Dunbar-Nasmith, V.C., K.C.B.

For the next 2 hours we tacked backwards and forwards across the channel, hitting each side in turn, slowly tacking out of the place, mostly on the bottom. The battery got pretty low but the tide helped a lot. By 2 p.m. we were out in deep water and had a squint and found all clear.

The second torpedo had done wonders. It made two big circles in the main harbour just missing the liner " General " with all the Turkish H.Q. staff on board ; then it turned and ran dead straight, as though guided, under the middle arch of Galata Bridge ; then, still dead straight up the Golden Horn for about a mile, turned hard-a-port, and sank a decent-sized merchantmen alongside a wharf. This was also seen by an agent of ours called Slade, who was watching from Pera Cemetery at the time.

We afterwards went in several times, sank ships, took photographs, etc., without any excitements at all. Once we went nearly inside on the surface at night."

Now let us turn to Germany and review her submarine operations during the War.

Finding that our overwhelming sea power prevented her taking decisive action against our sea-borne trade by her surface ships, Germany turned to the submarine as being the only type of vessel that could maintain itself and act offensively in spite of our command of the sea. At first this submarine war against shipping called for no special type of submarine—the " patrol " class being quite suitable for the task ; but as our defences increased in home waters the need was felt for submarines capable of operating further afield. Germany therefore built what were known as " cruiser " submarines. These displaced from 1,500 to 2,000 tons ; had an endurance of as much as 10,000 miles ; were armed with about 20 torpedoes and two 6-inch guns ; and were capable of remaining at sea for anything up to four months. Altogether they were very formidable vessels.

Another special type which was developed by Germany was the minelaying submarine which came to be used with great effect against shipping by mining the approaches to ports and also swept channels immediately the sweepers had passed by.

Had Germany's High Command shown as much determination as some of her submarine officers at sea, the influence of the submarine campaign might well have been decisive. As it was, in 1917, the losses inflicted upon the Allied merchant fleets were so heavy that at one time there were the gravest doubts as to our ability to maintain the War, owing to the appalling dislocation of our supplies. In all, 5,408 allied and neutral merchant ships of 11,200,000 tons were sunk by the German

submarines as compared with 450,000 tons sunk by their cruisers and raiders. It is of interest that of this total over 400,000 tons of shipping was sunk by one commanding officer, Arnauld de la Perriere, who incidentally did not take command of a submarine till January, 1916.

Casualties in submarines during the War were heavy on both sides: we lost 54 out of 213, whilst the Germans lost 203 out of 372.

POST-WAR DEVELOPMENTS.

Since the War, various proposals have been made for the total abolition of the submarine or for definite restrictions to be placed on its employment. Personally, I do not think that the nations of the world will ever agree to its abolition—it is so much the weapon of the weaker Power, and practically all the lesser naval Powers possess a small number of submarines. There is no denying that the mere existence of a few submarines does add very considerably to the security of any country as far as sea attack is concerned. No one is going to take a force of surface vessels or a convoy of transports into waters where hostile submarines may be present without giving very careful consideration to the means of defence against under-water attack.

Submarines have developed steadily since the War, but only two new types have been produced. The first is the seaplane-carrying submarine, but this is still very much in the experimental stage; one British submarine, "M.2," was converted into a sea-plane carrier, but was unfortunately lost with all hands about three years ago. The second is the fast Diesel-driven submarine intended to accompany the fleet. The chief advantages Diesel-drive has over the old steam-driven fast "K" class is that it gives far greater radius of action, and much quicker diving. The first of this class, the "Thames," has been in service some little time. She can steam 22.5 knots on the surface, and can dive remarkably quickly.

All post-War submarines are better equipped for keeping the sea, and provide some slight comfort for their personnel; many have such a luxury as a very diminutive bathroom. On the whole they possess much greater fuel endurance, some being able to steam half round the world without re-fuelling. Their wireless installation has far greater range, which adds much to their value for reconnaissance. In general, submarines since the War have developed along normal lines, and no very revolutionary design has been evolved.

CONCLUSION.

What, then, has been the effect of submarine development on naval warfare? Prior to the Great War there had been no real opportunity

for trying out this type of vessel under war conditions, principally because there had been no great naval war except the Russo-Japanese War in which neither side employed submarines. Actually, the Greeks used submarines in the Balkan War against the Turks and the honour of making the first torpedo attack with a submarine under war conditions goes to that nation. But, as it happened, the Turks were quite unaware that their fleet had been attacked, and as far as I know the fact that the Greeks possessed two submarines had no influence on Turkish strategy or tactics. In fact, the Turks disregarded the submarine threat.

Admiral Keyes has described vividly in his recent book the struggles he had prior to the War to make the authorities take the menace of the submarine really seriously. When the Great War broke out there were people on both sides who were inclined to adopt the Turkish attitude towards this new weapon. But one or two unpleasant events, such as the sinking of the "Hogue," "Aboukir," and "Cressy" within a few minutes of each other by a single submarine, forced everybody to realize that this was a new factor which must be considered, and I think it can be said that no other recent development has had a greater influence on naval warfare generally than the submarine: both tactics and strategy have had to be modified, and the pre-War ideas of blockade and control of the sea have had to be revised, all on its account. Faced by the threat of submarine attack, it is no longer possible to maintain regular patrols of either heavy ships or cruisers off the enemy coast; all ships have to use high speed and, possibly, to zig-zag, thus reducing their endurance and increasing the wear and tear of their machinery; screens have to be provided for valuable ships; ports and bases have to be defended against submarine attack.

The old idea of blockade, where the blockading fleet took station off the enemy coast, has become impossible in the face of submarine attack: in the Great War our so-called "blockading squadron" had to patrol to the westward of the Orkneys and Shetlands—some 600 or 700 miles from the German coast.

Control of the sea is also complicated by the submarine. The movements of enemy surface vessels can sometimes be controlled or restricted, but the same cannot be said of his submarines.

The attack of submarines on commerce in the last War forced us to equip a vast fleet of auxiliaries to hunt them and give some protection to our harassed merchant ships. It also forced us to return to that age-old form of protection against raiders—convoy, and it was convoy that finally mastered the submarine menace.

Briefly, the submarine has produced these changes in naval warfare due to its unique characteristic of being able to render itself invisible by diving. This allows it to operate without support in waters which may be under enemy control as far as the surface is concerned, and it also allows the best use of the element of surprise in delivering attacks.

As to the future, it is hard to say; but the submarine still remains the only type of ship—and here I include aircraft in the term "ship"—that can maintain itself unsupported for long periods in the face of a distant enemy. With the great strides made in wireless, submarines are able to carry out reconnaisance patrols off a distant enemy coast, transmitting reports of the enemy over distances of several thousand miles—this in addition to any offensive action they may be able to take should the opportunity offer.

On the other hand, anti-submarine measures have vastly improved since the War, and aeroplanes have become a menace to their activities, especially in clear waters such as the Mediterranean. Against this, submarines can dive much deeper than before, which is a great protection to them. and they possess other means of attempting to combat the anti-submarine measures that may be taken against them.

The Washington and London Treaties have both tried to put an end to unrestricted submarine warfare against sea-borne trade, and have ruled that if a submarine attacks a merchant ship she must observe the rules of visit and search and make provision for the safety of the passengers and crew before the ship is sunk. In spite of these agreements, however, any nation which finds the stranglehold of sea power fastened on its supplies may be tempted to employ the submarine again in a ruthless fashion to loosen that stranglehold. For that eventuality we must be prepared.

DISCUSSION.

MAJOR W. W. GRANTHAM: Why did Pitt give £15,000 to the American? Was it because we bought the patent?

THE LECTURER: Yes, we bought the patent because we felt we were supreme at sea, and therefore the submarine was a more dangerous weapon when directed against us than in our hands. Pitt was anxious we should not be exposed to the menace of the submarine.

MAJOR GRANTHAM: Did he pay that sum in order to adopt the submarine?

THE LECTURER: No, he was against adopting it, and therefore paid to prevent the Americans developing Fulton's submarine.

COLONEL NORMAN KING: Can you tell us how in the XVIIIth century they provided air? Also, how did they provide drinking water on long voyages in those days?

THE LECTURER: The provision of air has always been the same: the air used is that which is in the submarine when she dives; no fresh air is available, but we now have means of purifying it a little. It gets frowsty, but that is a gradual process. After some time it gets a trifle unpleasant, and you pant for breath. The answer to the other question is that water is carried. Our practice is to have large tanks with sufficient fresh water to last us the whole time. Naturally we are not on the shore-going scale for washing: a lick and a promise a day is all we get. Some other nations use electric or other types of evaporators; but, in order to cut down the machinery we favour a large supply in tanks.

THE CHAIRMAN:

The question asked by the last speaker reminds me of the report of the captain of "E.4" at the beginning of the War. He described his experiences in the Bight, where he was incessantly hunted by the enemy and said, "after twenty-four hours under, breathing nearly twice as quickly, otherwise no difficulty at all." I think if one found oneself breathing twice as quickly in ordinary life, one would not regard it as too easy.

I think everyone interested in naval matters realizes the value of the work carried out by our submarine officers in preparing themselves for the War, and their achievements when it came. It is not surprising that those who survived should have reached high rank: they now include a Lord of the Admiralty, the late Commander-in-Chief of the Eastern Squadron, and several other Flag Officers employed.

It is very pleasing to see these splendid pioneers rising to such heights in the Service, and exercising an influence in the conduct of the Navy to-day.

The customary votes of thanks to the Lecturer and Chairman were carried by acclamation.

WASSMUSS[1]

By Lieut.-Colonel F. A. Hamilton, O.B.E., F.R.G.S.,
late 3rd Cavalry, Indian Army.

WASSMUSS, a young German of remarkable character and ability, who hated the British intensely, started his career as an Attaché to the Embassy at Teheran. Even in those days those who met him recognized something indefinable and unusual about him. In course of time he was appointed Political and Commercial Agent in the Persian Gulf, and later became German Consul at Bushire in Southern Persia. He spoke English and Persian fluently —in his younger days one of his accomplishments was his power of suppressing his identity by disguising himself as a donkey-man or some other character and visiting the native city and bazaars. By this means he gained an *entrée* into queer places, often riding upon his donkey, seated astern in the Persian fashion. In this capacity he proved most valuable to his Minister, for the bazaar in Eastern cities is the vocal centre of all intrigues and inside knowledge. This great asset stood him in good stead in later years.

During the Great War he became by far the most successful German agent in Persia. Before the War he had entertained lavishly and gave presents to the chieftains of the neighbouring tribes, thereby creating a strong pro-German confederacy. When war was declared Wassmuss was on leave in Germany, but returned with the utmost haste to Persia, where he used every opportunity to make things as unpleasant as possible for the British, whom he considered had no more right to be in Persia than his own countrymen!

In January, 1915, he went to the country between Bushire and Shiraz. He was captured by a pro-British khan, but managed to escape. He next made Kazerun his headquarters and from there he organized anti-British propaganda with no little success; so much so that the Indian Government were obliged to increase the garrison at Bushire, occupying it with a considerable force. Some hard fighting against the tribesmen took place in which Indian cavalry, under cover of artillery fire, effected a brilliant charge, attended unfortunately by the loss of their British and Indian leaders. The tribesmen, with many

[1] For a summary of Wassmuss's career see Correspondence, R.U.S.I. Journal for August, 1934, p. 609. This account is founded on a German biography.

casualties, were driven into the hills. This had the effect of keeping them quiet for some time.

Wassmuss consequently turned his attention to the turbulent Province of Fars, and there also became a thorn in the side of the British. In March, 1915, he returned to Shiraz, where Mukbar-u-Sultana, the Governor-General, who had been educated at Berlin, was strongly pro-German and a great friend of Wassmuss. Here he found several kindred spirits, Germans, Austrians, Turks and some Afghans, who were afterwards captured by the British and deported. Amongst them were the notorious Zugmeyer, Niedermeyer and other so-called German professors, men of ability and no little sense of humour. When they were deported, their diaries, complete with sketches, fell into our hands. In one sketch a Persian was shown as being descended from a pig, a fox, a hyena, a hare and a vulture—this latter carrion-eating *avis* had laid an egg and a Persian was the result! Alas, they loved not their Iranian brothers!

Wassmuss was able to do great things with his Persian allies and was aided considerably by the gullibility for which they are famous. To give an instance: a wealthy merchant of Shiraz was induced by Wassmuss to become a German agent, and was informed that the Kaiser (Haji Wilhelm) would send him a message by wireless. Entering the room where Wassmuss was tapping a telegraph instrument attached to a pole, he was gravely informed that the Kaiser was present in person at the Berlin office and was instructed to kiss the ground thrice. After some more tapping, he was further informed that the Kaiser graciously inquired after his health, and that it was usual to offer a large sum of money in return for the compliment. This being also the Persian custom, the unsuspecting merchant presented a Persian bill for the equivalent of £10,000. The Kaiser then graciously accepted the money and promised to send his portrait by "wireless." It actually reached the merchant in two days' time, Wassmuss having a large supply of them with him, and the merchant was delighted until the arrival of the British in Shiraz, when he discovered the hoax and confessed that he had "eaten dirt."

In October, 1915, at the instigation of Wassmuss, the anti-British faction in Shiraz organized an attack on the British Consulate, the looting of the Imperial Bank of Persia, and the capture of the entire British Colony, which was sent under escort down the long and difficult road to Bushire, on the Persian Gulf. The ladies, inspired by Mrs. Ferguson, the wife of the Scottish bank manager, even when grossly insulted by a raging mob at Kazerun, acted to the everlasting credit of the British race. The party was here divided, the ladies being sent to

Bushire, while the men were interned at Ahram, until an exchange of prisoners was eventually arranged. They suffered hardships and privations during their seven months' captivity, but, on the whole, were not too badly treated.

On the arrival of the British in Shiraz in September, 1916, the German Consulate was raided, its inmates taken prisoners and in due course despatched under escort to Banderabbas. The prisoners under the command of a Persian prince were allowed to escape ! The reason was suspected but never established. Wassmuss and his servants succeeded in evading capture and lived for some time disguised as Persians. He then found himself obliged to appreciate the situation. Germany was thousands of miles away ; all roads were blocked by the Allied troops, so he wisely decided to remain in Persia and do his best to further the interests of his Fatherland. He again planned to go South towards Bushire, hoping to raise the tribesmen against the British in Bushire and Shiraz. So he fled by night and placed himself and his faithful servant under the protection of Solat-ud-Dowla, Ilkhani or chief of the powerful Kashgai tribe. According to tribal law he was made welcome and treated as an honoured guest, more especially when Solat became aware that Wassmuss was in possession of much money with which to buy rifles, ammunition and other necessaries. At Kazerun he managed to get possession of a typewriter and set up an office for himself. The Kashgai tribesmen are fine fighters in their own loose guerilla style of warfare, and are brave and enterprising, well mounted and well armed. Though they had no idea of discipline in our sense of the word, if left to themselves they will fight with an amazing zeal and untiring energy. Of such was the material with which Wassmuss had to work.

With them he lived as a tribesman and in his native costume was almost indistinguishable from a Kashgai chieftain. He let his hair grow and cut it flush with the nape of the neck in local fashion ; his moustaches became long and drooping, his beard short and thick, and he had soon altered so much that none of his old friends would have recognized him. He turned Mohammedan and married the daughter of a chieftain of this nomad tribe. With his wonderful political acumen he managed to bend to his will Solat, who was in every sense of the word a nomadic Persian, furtive, scheming and undecided. He virtually became Solat's Chief of Staff, and made the best use of his fighting men, training them into a very useful irregular mounted force. They were well armed with up-to-date small-bore rifles, and German money was available to purchase further supplies at a price from the Arab traders, who, in spite of the British blockade on the Persian Gulf, succeeded

in smuggling inland a certain quantity of arms and ammunition. For purposes of instruction, Wassmuss took his tribesmen on night expeditions. It is said that, amongst other escapades, he raided the French Consulate in Bushire, as well as his own old home, the German Consulate, then unoccupied, to obtain German books, as well as other necessities. He avoided raiding the native city, which was a harbour of refuge to him and his tribesmen. Nothing escaped his notice, and in every possible way he thwarted the British.

With the object of capturing Wassmuss and his followers, and occupying Kazerun, a small column of Indian troops and South Persian Rifles attempted to reach Kazerun from Shiraz on 25th December, 1916, but met with a reverse in the mountainous valley of Dasht-i-Arjin and were compelled to retreat to Shiraz. This was a distinct blow to British prestige, and on receiving Sir Percy Syke's despatch from Shiraz the Indian Government decided to send reinforcements of Indian troops and a competent staff to Shiraz. Accordingly a whole divisional staff and reinforcements were sent in February, 1917, via Banderabbas to Shiraz, which they reached in April, 1917, after a march of 430 miles. Indirectly Wassmuss may be held responsible for thus diverting a very considerable force, with staff complete, from another theatre of war, where they could have been employed against the allies of Germany. How we in Shiraz, time and again, cursed him for holding up our English and Indian mails! The Swedish Quartermaster of the South Persian Rifles, who was an old pre-War crony of Wassmuss, was often heard to exclaim, " It vas dat Bludey Vasmoos, you know."

During the three strenuous months of the investment of Shiraz by the Kashgai, until their final defeat by the British in 1918, he was virtually their organizer-in-chief. His bravery was phenomenal. After the defeat of the Solat and his Kashgai, Wassmuss had no further scope for his energies. He eventually managed to escape towards the Bakh Tiari country by passing through South-West Persia disguised as an old Persian woman, heavily veiled and, once more, mounted upon a donkey. His fellow countrymen may know very little of his gallant one-handed exploits on behalf of his Fatherland during those three years from 1915–18, but we in the South Persian Force often had reason to mention him and had undoubted admiration for a brave man who gave us a lot of trouble, and served his country well!

THE STRIKING POWER OF THE ROYAL AIR FORCE

By Squadron-Leader H. V. Rowley, R.A.F.

THE question of the strength of the Royal Air Force to-day is one which has been discussed at length recently both in Parliament and by the Press. The discussion has usually been directed solely to our strength as measured in terms of numbers of squadrons; yet the real strength of a fighting force does not depend only on numbers: it depends on many factors, the chief of which are morale of personnel, training, and equipment. From this point of view it is usually accepted that the Royal Air Force is not only superior to the air forces of potential enemies, but that it is as good as is reasonably possible. But it is the purpose of this article to attempt to prove that the self-complacent view that all is well in this best of all possible R.A.F. worlds is wrong, that the much vaunted efficiency is non-existent, the striking power negligible, and that the Royal Air Force is but a broken reed which, under the fierce wind of war, will not only break but will be blown away altogether.

This is a very sweeping statement, and it will be countered at once by the reply that the Royal Air Force is at least as efficient as any of the air forces of other great Powers to-day. True perhaps, but all the same it is inefficient compared with what it might be at the present time. Since destructive criticism is not only easy but also usually valueless, an endeavour will be made to show how the real striking strength of our force may be brought up to a reasonable level.

Where do we fail? Is it in morale of personnel? Here we may honestly congratulate ourselves that, in spite of sundry handicaps such as the regrettable but necessary short service system, our personnel are above reproach. Is it in training then? No doubt our training is open to improvement, but no one can deny its basic efficiency. No, the whole crux of the problem is the question of equipment. The most gallant and well-trained troops, if armed with bows and arrows, are fairly certain to be defeated by any force possessing modern weapons.

One occasionally reads in the technical papers that this nation or that nation has developed some aircraft of outstanding performance. Questions are asked in the House: why cannot the Royal Air Force

be re-equipped at once with new aircraft surpassing their rivals in performance? But generally the level of excellence in our aircraft is well up to standard as compared with other Powers, and it is quite impossible to re-equip the whole Service every time some foreign designer has a brain wave. It would appear, therefore, that all is well and we may rest content. But all is not well. The main power of the Royal Air Force in defence and attack, which in these days of aerial wars have become almost synonymous terms, rests with the Air Defences of Great Britain, in which our main striking force of bombers and defensive force of fighters are concentrated. The A.D.G.B. consists of sixteen light, one medium, and eight heavy bomber squadrons, and seventeen fighter squadrons. It is not proposed to go into the debatable question of the relative proportions of fighters to bombers; fighters may be a political necessity, even though by maintaining them we have to be content with a smaller striking force of bombers. But the spear-head of the A.D.G.B. forces is the bombers, and it is with the bombers that we are mainly concerned.

The light bomber squadrons consist of Harts, Gordons, Wallaces, and Wapitis. The majority of these aircraft are good, reasonably modern, and easy to produce in quantity. Their designers have more than complied with the requirements laid down in Air Ministry specifications. But—and this is a large and important " but "—their average radius of action is limited to something under 250 miles. Supposing for the sake of argument we regard London as our air base, and draw a circle of 250 miles radius around it, the very glaring limitation of our light bombers is at once apparent. An enemy can do what he likes beyond this radius. He is immune from attack by our light bombers. In other words, there would seem to be a reasonable prospect of all our light bombers—which represent 64 per cent of our total striking force—being useless in war. Even should the enemy be within their range, their bomb load is small, being limited to 500 lb., and their field of fire is limited, particularly in the forward and downward direction.

At present we have only one squadron of medium bombers.

Then, take our heavy bombers. There is no doubt about their range or bomb load, and again their designers have complied with, and even exceeded, the requirements of the official specification. Are they not, therefore, a powerful and formidable force? Again it is submitted that our heavy bomber force in war will be practically useless, and that we have definite proof to this effect.

During the last war, the science of night fighting by combining the operations of searchlights and single-seater fighters was in its infancy. Only one squadron was formed with a view to concentrating on this work; but the astounding and remarkable success of this squadron

in the very short time during which it operated as a night fighting unit proved conclusively that the big, slow, bomber is doomed if attacking targets defended by a searchlight-fighter combination. The big German night bombers were too slow and unwieldy to avoid the searchlights. Once caught they could not escape from the fatal beams and were an easy prey for the waiting fighters. No amount of armament was of any avail since they could not see the attackers. Yet, to-day, our latest type of heavy bombers have a top speed of only 140 m.p.h. or so ; they are too big, too slow, and too unwieldy, and will surely be destined to share the fate of the German night bombers.

The solution to the problem has been staring us in the face ever since some long-sighted Air Member for Supply and Research placed an order for the Sidestrand. In the fast, light, twin-engined aircraft we have the type which has the advantages of our present types, but none of the disadvantages. It can be used for long-range work when carrying a small load of bombs ; and, alternatively, can carry a heavy load for a short distance. It can be used for day and night work with equal success. Imagine a formation of five fast twin-engined bombers, armed with guns in front, behind, and below, travelling at 200 m.p.h. A difficult problem for any fighter combination to tackle. Again, imagine the same aircraft working singly at night. If caught by a searchlight they would be sufficiently handy to swing out of the beam, and their high performance gives the attacking fighter little margin of superiority in performance. The experience we have gained with the early prototype, the Sidestrand, has surely convinced most people of the manifold advantages of the design, and we have now ample proof that this type can be developed to give an amazing performance. The new civil monoplanes developed by the United States cruise at speeds approaching or exceeding 200 m.p.h., and their load-carrying capacity leaves no doubt as to their usefulness if converted to military purposes. Mr. Antony Fokker does not abandon all his own designs as antediluvian and take up a licence for building the Douglas for fun. He has admitted in his bulletin that the type has been developed to a high pitch in America, and to build them under licence is cheaper than experimental work on his own.

Since it is clear that the fast, light twin-engined aircraft will prove an extraordinarily efficient weapon for day and night use, it is only logical to demand that, when we do re-equip, we should adopt one standard type throughout the whole of the A.D.G.B. At once we shall be confronted with the problems involved by such standardization. The usual objections will be put forward : it will be argued that most of our aircraft firms will go out of business if we concentrate on one type ; design will stagnate, and healthy competition will cease for ever.

But we have had a certain measure of standardization already, and so far none of these evils has occurred; for instance, Hawker type aircraft have been built in such quantity that the Air Ministry has had to subcontract to other firms. The same number of aircraft will be required and, if standardization within reasonable limits is adopted, firms can be kept employed just the same as before and the work will be divided between them. The money saved by standardization—and it has been proved that we do save—may be devoted to keeping the design staff of all firms in a state of activity. A competition should be held for a replacement type every year with payments for all drawings submitted and prizes for winning designs. These payments and prizes should be sufficient to justify every firm employed on sub-contract work keeping its design staff going and going well. Then, when the time does come for replacement of our standard type, our designers will be thinking in terms of last year's model, not in terms of their effort of six or eight years ago. Reasonable standardization not only saves money but increases instead of hampering progress.

It is interesting to speculate on what form such a " fast twin-engined aircraft " will take should it be adopted as a standard type. Recent research work and new methods of construction are at last challenging the age-old supremacy of the biplane. It is also a significant fact that the U.S. Army Air Service proposes to abandon biplanes altogether. Generally, everything seems to point to the low-wing cantilever monoplane with retractable undercarriage as the most promising type for our needs. It may well be argued that to quote America's development and ideas is not helpful. It is true that our own constructors, with one exception, adhere to the biplane for service aircraft; but in spite of that our designers have not been idle in tackling this problem, and a considerable amount of quiet development work has been going on during the last two years. A specification was recently published by the Blackburn Aircraft Company of a 10-seater, twin-engined aircraft equipped with two 300-h.p. engines; and it is estimated that this aircraft will have a top speed of approximately 200 m.p.h. This design employs the Blackburn-Duncanson system of single tubular spar construction for the wings, and it would appear that this is likely to prove lighter for the same strength than even the most modern American designs. Also it saves the weight of petrol tanks, as the fuel is carried in the hollow spar. This system allows of aircraft carrying petrol in excess of normal requirements without the necessity of tying on extra tanks outside, as is the present custom in the Royal Air Force when extra range is required. Should this aircraft come up to its estimated performance it will provide a very interesting comparison with the latest G.P. type being used in the Service, which has approximately the

same horse-power ; it will also provide practical proof of the capability of British designers to produce really modern high-speed aircraft. Again, it is reasonable to suppose that a development of this type, fitted with higher-powered engines, might be built to comply very well with a specification for a really fast twin-engined medium bomber for day and night use.

The Blackburn H.S.T. 10 is quoted in this article merely because it is the only design in England, as far as the writer's knowledge goes, which shows promise of being developed to comply with future needs, but no doubt there are other firms tackling the problem as well. As stated above, it is useless to run down existing policy unless one can replace it by a better one. Equally, a new policy is useless unless there is a reasonable prospect of being able to carry it out. It is the writer's conviction that, not only is the policy of standardizing a fast, twin-engined medium bomber the best solution to a difficult problem, but also that such a type can be developed within a very short time by British aircraft firms. Up to the present day it seems that the normal time which elapses between the specification going out from the Air Ministry and the aircraft being in service is about five years : that is five years of design, building, and experimental work before an aircraft to comply with reasonably easy specifications can be actually in service. Is it quite impossible to speed things up ? The recent MacRobertson race provides the answer. The De Havilland firm was requested to provide an aircraft for this race. The aircraft had to accommodate two people, have dual control, have a cruising speed of 200 m.p.h. or over and a range of 3,000 miles. It had to be designed, constructed, tested, and ready for the race within a few months. That this was done, and done with two ordinary cheap air-cooled engines of a total h.p. of about 460, is now history.

The MacRobertson race has proved that ordinary American commercial aircraft have a cruising speed higher than the top speed of our fast, short-range light bombers, and also that aircraft can be designed, built, tested, and brought into service, to comply with a specification formerly deemed impossible, in approximately one-twelfth the time taken to produce service types. Let us hope that the Air Ministry may profit by such a salutary lesson.

To sum up, therefore, it appears that, firstly, the striking power of the Royal Air Force to-day is almost negligible ; secondly, that the striking power can be improved out of all recognition by the adoption of a fast, twin-engined medium bomber for day and night use ; thirdly, that such a type may be standardized without detriment to aircraft firms and progress of design ; and, finally, that we have designers and firms in this country who are capable of producing such aircraft within a period of months rather than years.

THE DISARMAMENT DEADLOCK

By MAJOR B. T. REYNOLDS, M.C., late R.A.

THE essential history of the Disarmament Conference may be said to cover a period from February, 1932, when it was instituted, to 11th June, 1934, when it adjourned after having set up the necessary machinery to ensure its continued existence in a state of suspended animation. Since then it has turned in its sleep once or twice, and it is conceivable that it may awake to activity again before long in the more favourable international atmosphere that has been produced by the settlement of the Saar problem.

In his book, *The Disarmament Deadlock*,[1] Mr. Wheeler Bennett describes the trend of international events and relations, and the various influences which affected the deliberations at Geneva, and which have, so far, frustrated all efforts to secure practical disarmament.

Whatever difficulties the conference may have had to contend with, lack of preparation was not one of them. When the War was drawing to its close, the principle of general disarmament to the lowest possible level was clearly laid down in the fourth of President Wilson's Fourteen Points, which formed the fundamental basis on which Germany agreed to treat for an Armistice in 1918. The race in armaments that took place in the years immediately preceding 1914 was regarded as one of the primary causes of the War, and the principle of limitation of armaments by agreement was consequently also given definite shape in the first paragraph of Article VIII of the Covenant of the League, which formed an integral part of the text of the four Treaties of Peace signed at Paris. The promise of general disarmament was further emphasized in the official reply of the Allied and Associated Powers to the observations of the German delegation on the conditions of peace, which were handed to Count von Brockdorff Rantzau on 16th June, 1919, in the words :—

"The Allied and Associated Powers wish to make it clear that their requirements in regard to German armaments were not made solely with the object of rendering it impossible for Germany to resume her policy of military aggression. They are also the first steps towards the general reduction and limitation of armaments which they seek

[1] "The Disarmament Deadlock." By J. W. Wheeler Bennett. (Routledge.) 15s.

to bring about as one of the most fruitful preventives of war, and which, it will be one of the first duties of the League of Nations to promote."

Thus, the Allies, in disarming Germany, would appear to have simulataneously undertaken the obligation to reduce their own armed forces in conformity. This represents the basis of the German claim to equality to-day, and to a non-legal mind it seems at least as good as any other claim that is based on the Treaty of Versailles. On the other hand, the French demand for "security" as the essential preliminary to disarmament appears equally reasonable. The problem is to equate the two.

From 1919 to 1930, disarmament was more or less continuously under discussion at Geneva by one branch or another of the League of Nations, but with very little concrete result. Indeed, the only sphere in which the best part of twelve years of devoted work had produced any practical form of disarmament by agreement, as opposed to the purely unilateral form that had been imposed on Germany and her allies by the Peace Treaties, was in naval armaments, which were successively regulated by the Washington (1921–2) and London (1930) Conferences. But, in this case, it is noteworthy that the Powers primarily concerned—Great Britain, the United States and Japan—had all been in the same camp in the late War, and the principal interests involved were in the spacious sphere of the Pacific and not amongst the closely settled frontiers of Europe. Even so, in the long run, the sailors can hardly be said to have made any more substantial progress than the soldiers, since the whole position has now been thrown into the melting-pot once more by the Japanese denunciation in 1934 of the agreements previously arrived at.

The preliminary basis for the work of the Disarmament Conference was constituted by a Draft Disarmament Convention, that had been drawn up with infinite labour in 1930. The deficiences and the merit of this document were aptly summarized in the French press of the time in the phrase, "Ce document a une grande vertu, qui est d'éxister." It was more remarkable for what it did not, than for what it did, say. The decision that the Conference should meet in February, 1932, was taken at the meeting of the League Council held in January, 1931, and, strange as it sounds, the reason given for the further delay of one year was that ample time should be given for preparation! No doubt, the underlying reason was the hope that the next twelve months might see an improvement in the international atmosphere. But, if this was the case, such hopes were doomed to failure. In fact, 1931 proved to be a most disastrous year. Mr. Wheeler Bennett devotes a useful appendix to the events of 1931, which determined the atmosphere in which the conference finally met. These events included the ill-fated

proposals for an Austro-German Customs Union; the financial crisis which commenced with the collapse of the Kredit Anstalt in Vienna and spread to Germany and Hungary, leaving all three countries on the verge of bankruptcy; the protracted negotiations in connection with the Hoover Moratorium; the British departure from the Gold Standard and the coming of the National Government in this country; lastly, the occupation of Manchukuo by the Japanese and the dispute with the League that eventually led to Japan's resignation from her seat on the Council—an ominous precedent for Germany. The year finally ended leaving France in a position of unprecedented relative financial and diplomatic strength in Europe, a position the real value of which was somewhat modified by the gathering crisis in the United States, that was bound to lead to a recurrence of isolationism, and by the mortal blow which had been dealt by the financial crisis to the prestige of the democratic republican régime in Germany.

When the Conference finally met on 2nd February, 1932, under the presidency of Mr. Arthur Henderson—who had lately ceased to be British Foreign Secretary—Herr Bruening, the German Chancellor, was fighting for his political life against the rising tide of nationalism in his own country and his position was so desperate that he stood in urgent need of success at Geneva. That success he was not destined to secure. The conference was opened by the submission of a French plan by M. Tardieu, which amounted to an amalgam of the French proposals for an international police force, which had been submitted to the League of Nations Committee of the Peace Conference in 1919, combined with the provisions of the famous Geneva Protocal of 1924. The motive underlying these proposals was plainly "security" for France, and virtually no concession was made to the German point of view. M. Tardieu was supported by the delegates of Belgium, Poland, and the Little Entente. On the other hand, the "disarmed Powers" were supported in their demand for "equality" by Italy, the U.S.S.R., Spain, and Sweden, and were assured of Anglo-American sympathy. When the Conference adjourned for the Easter recess, the most outstanding developments of the first weeks had been the interest aroused by proposals for the abolition of military aircraft, coupled with international control of civil aviation, and the support for the abolition of "aggressive" weapons. But it was evident that each nation would continue to regard every proposal in the light of its own special interests and problems. The United States and Great Britain urged the abolition of submarines, but clung to battleships; the smaller naval Powers denounced battleships, and stoutly defended their submarines as being "defensive"; France demanded "security" before disarmament; Germany wished for the prohibition of all capital ships

over 10,000 tons, with a view to retaining her " pocket battleships " ; while a general wrangle had started as to the exact definition of the term " aggressive " as applied to any particular weapon of war.

In April, Bruening, whose position was becoming increasingly desperate at home, decided to go to Geneva to make a definite offer to the Powers on the subject of " equality." He proposed that, in return for an undertaking given by Germany not to increase her armaments for five years, she should be permitted to reduce the twelve years' period of service in the Reichswehr to five years and to organize a militia amounting to 100,000 men. He also asked for the abrogation of the prohibition on the possession of tanks and aeroplanes by Germany. He was willing to renounce these weapons altogether on condition that other Powers would do the same ; alternatively Germany would be satisfied with " samples " of them. Mr. Wheeler Bennett's account of the intrigue that wrecked these not unfavourable proposals, thereby encompassing the downfall of Bruening and the accession to power of the Papen-Schleicher Cabinet, makes most interesting reading.

However, those who had torpedoed Bruening met with little more success than their unfortunate predecessor. Internally, they were faced with exactly the same difficulties and, externally, they were no more able than he had been to secure any concession to the German claim to " equality," which, under the impulse of Hitler's demagogy, was rapidly becoming an obsession with the people of Germany. In the summer of 1932, Herr von Papen at last succeeded in bringing back a final agreement on the vexed question of Reparations, but the Disarmament Conference still proved barren of results. The respective theses of " security " and " equality " were being enlarged on, in tones far from conciliatory, in the speeches of responsible statesmen in France and Germany. The first session of the Disarmament Conference closed in July in a far worse atmosphere than it had originally begun.

In September, Baron von Neurath informed Mr. Henderson that the German delegates would be unable to take part in the forthcoming meetings of the Conference, in view of the complete lack of concession to the German point of view. Signor Mussolini came out with a series of newspaper articles in support of the German claim to equality, and the British Government, on 19th September, issued an official note. This was a closely reasoned document, based on the legal aspects of the case, and it ended with a warning that " a desirable consummation cannot be obtained by peremptory challenge or by withdrawal from deliberations that are about to be resumed. It can only be achieved by patient discussion, through the medium of conference between the States concerned." As might be expected the British Note received a better press in Paris than it did in Berlin.

In the end, after strenuous negotiations, an agreement was reached on the principle that Germany should be granted the equality for which she had been striving and this was incorporated in an official agreement on 11th December. It may be that the negotiations had been momentarily facilitated by the dangers of the internal situation in Germany, where the Nazi wave was rising ominously. But there still remained the task of implementing the agreement and of translating the principle of equality into concrete terms. While the Conference debated at Geneva, events once more took a hand in Germany. On 17th November von Papen's government fell and his place as Chancellor was taken by General von Schleicher, who did not remain long in office. On 28th January, the aged President refused to grant him power to dismiss the Reichstag, in which he was unable to secure a majority. On 30th January, Hitler became Chancellor.

The advent to power of Hitler at the head of the revolutionary National Socialist movement had the effect of galvanizing the British Government into activity in an attempt to end the deadlock at Geneva. A Draft Convention[1] was produced with the aid of the Admiralty, the War Office and the Air Ministry, and submitted to the Conference on 16th March. This was a detailed plan designed to implement and translate into practical terms the Agreement of 11th December. It went much further towards reconciling the French and German points of view than anything that had gone before. But, meanwhile, the course of events in Germany had aroused widespread anxiety, not only in Paris but also in London, as to the pacific intentions of Herr Hitler. The German delegate at Geneva, Herr Nadolny, had taken up an attitude of complete intransigence. The declaration of the German Foreign Minister, Baron von Neurath, that whatever happened at Geneva, Germany would rearm, did not improve matters. Lord Hailsham in the House of Lords spoke ominously of "sanctions," whilst Herr von Papen was making a pronouncement in his least fortunate vein on the military virtues and the aversion of all good Germans to dying on a mattress. By the middle of May the situation was genuinely serious and President Roosevelt addressed a message to "The Emperors, Kings and Presidents" of the fifty-four States participating in the Disarmament and Economic Conferences, urging on them the need for political and economic peace. Then, at a special meeting of the Reichstag, summoned on 17th May, Herr Hitler proceeded to issue a pronouncement on foreign policy that might have come from the lips of Bruening or Streseman. He accepted the British

[1] The British Draft Convention of 16th March, 1933, is printed in the form of an Appendix to Mr. Wheeler Bennett's book.

plan as the starting point for the solution of the disarmament problem and expressed himself as willing to give guarantees of security. The crisis was past and Herr Hitler had achieved a considerable tactical success. The onus of further concession was now thrown on the French.

Then, once more, extraneous events intervened to make things more difficult. The isolationists in the U.S. Senate brought to naught a fruitful attempt at co-operation on the part of Mr. Cordell Hull. The conclusion of the Four Power Pact between Great Britain, France, Italy, and Germany on the 8th June and the series of negotiations between Soviet Russia and her neighbours that were brought to a successful conclusion by M. Litvinoff, set up a fresh series of stresses and strains. The pressure inside Germany continued to rise until, on 14th October, Hitler officially announced the withdrawal of his country from the League of Nations. This step was attended by none of the disastrous consequences that were predicted for it; but, since then, if not before, there is no doubt that Germany has taken that which the Disarmament Conference was unable to bring itself to grant her, and has carried out a very considerable measure of rearmament.[1] Nor has France or any other of the *status quo* Powers, been able to devise any means of preventing her. The bluff was called. The Disarmament Conference dragged on until the middle of the summer of 1934, when, as we have seen, it adjourned after having made arrangements to reassemble whenever conditions should prove more favourable.

It is impossible to tell what will be the outcome. If one puts oneself in the place of the Germans, their attitude appears to be perfectly natural. The French reluctance to disarm in face of the German national revival is equally comprehensible. A considerable degree of anxiety on the part of those responsible for the defence of this country and the Empire, and also for implementing the various commitments into which we have entered, is also a natural corollary. Whatever other countries may have done, Great Britain can hardly be accused of not having carried out the disarmament engagements entered into at Versailles fourteen years ago. Otherwise the situation is unchanged. If anyone still feels that Disarmament is an essentially simple matter, he would be well advised to read "The Disarmament Deadlock."

[1] See "The International Situation," p. 168.

JAPAN AND THE FAR EASTERN SITUATION

By Captain M. D. Kennedy.

MUCH has been heard of late regarding Japan's alleged aggressive intentions. In support of such allegations, those who make them point to Japan's actions on the neighbouring mainland of East Asia since the outbreak of the Manchurian trouble in September, 1931. They also emphasize her general attitude of truculence, as evidenced by her insistence on naval parity and by the way she flouted the League of Nations and metaphorically snapped her fingers at the World—intransigence and truculence, incidentally, not unlike our own at the time of the Boer War. As further evidence of her alleged aggressive intentions, her accusers point to the steady increase in expenditure on her armed forces—an expenditure which rose suddenly from 405,700,000 yen for the fiscal year 1931–2 (equivalent to 27.1 per cent of her total budget for that year) to 696,000,000 yen (34.6 per cent) in 1932–3, 850,400,000 yen (36.8 per cent), in 1933–4, and 936,800,000 yen (44.3 per cent) in 1934–5; while a further increase to no less than 1,021,000,000 yen (47 per cent) will be seen during the coming fiscal year of 1935–6 if the figures reported in the Press are approved by the Japanese Diet in March.

That a certain amount of apprehension should be aroused by such indisputable facts as these is perhaps but natural; but to argue, as many do, that these facts provide clear proof of Japan's aggressive intentions is only possible if we overlook the fundamental underlying causes. Put briefly, these are:—

(1) Economic necessity arising from pressure of population and poverty of natural resources—a necessity due in large part to the action of Western nations in debarring Japanese immigrants and heightening tariff walls against the entry of Japanese manufactured goods.

(2) Anxiety regarding the security of her own shores and of her vital interests on the neighbouring mainland of Eastern Asia—anxiety due to the combination of Chinese instability, Soviet increase of military and political strength, and American potentialities for active interference in the Western Pacific.

Something of the significance attaching to the first of these two points will become clear when it is said that Japan's population is increasing by close on a million a year and that, on account of the mountainous nature of the country, statistics show a density of no less than nine hundred and fifty-nine persons to the square kilometre of cultivated land as compared to three hundred and ninety-four in the case of Belgium, the most densely populated country in Europe. If Japan had large possessions overseas for the absorption of her surplus population such as we have, or if nature had been more liberal with her in the matter of natural resources, this would not be a cause for such serious concern. The fact, however, is that not only is she badly cramped for space in the mother country itself and poorly endowed with natural resources, but her oversea possessions are infinitesimal compared with our own—a mere 110,585 square miles in all—and they provide little or no outlet for colonization or for the disposal of surplus population, as they have large native populations of their own to support and the Japanese immigrant is unable to compete with their low standard of living.

England, like Japan, is largely dependent on outside resources for many of the essentials of modern life; but she has first-rate coal and iron in plenty and, so long as she retains command of her sea communications, she can obtain wheat and supplies of many kinds of raw materials from the Dominions and her possessions overseas. To these oversea territories she can, moreover, send her surplus sons and daughters, and in them she can find markets for a large proportion of her manufactured goods. Japan is far less happlily placed. Coal she has in fair quantities, but the quality is poor. Iron ores are practically non-existent and the bulk of her other raw materials has to be obtained from sources outside her control. Although she is Lancashire's greatest competitor in cotton goods, she has to purchase all her vast supplies of raw cotton from foreign countries—from India, Egypt, the United States, and so on. She is one of the World's greatest consumers of raw wool, but she has to purchase every pound of wool that she requires for her factories from Australia, South Africa, and other foreign lands. And so it is with practically all the raw materials she requires for her factories and for her leading industries The one raw material which she is able to produce in large quantities, both for export and home consumption, is silk; but unlike coal, iron, wheat and oil, this is a luxury product rather than a vital, essential, basic raw material, and although it is true that a plentiful supply of fast-running rivers and streams provides her with water power for great hydro-electric works all over the country, this does not wholly compensate her for paucity of oil supplies and lack of good quality coal. Her oversea possessions,

strictly limited as they are in area, are practically valueless for providing an outlet for her ever-growing surplus popu'ation.

It will be seen, therefore, how poorly placed she is compared with the thinly populated and virtually self-contained United States, or even with ourselves ; and it is primarily because of this fact that she is so concerned about the security of her vital interests in East Asia and of her communications with the neighbouring mainland, as there—and only there—is she able to secure and develop nearby sources of supply for most of the raw materials she requires and ensure markets which will welcome the low price of her manufactured goods. It is only by providing work for her surplus millions in this way that she can hope to cope with her serious population problem, now that both her immigrants and her goods are being debarred from other lands.

In order to understand her fears regarding the security of herself and her vital interests at the present time, it is necessary to consider her position *vis à vis* her three principal neighbours—America, Soviet Russia, and China, in conjunction with developments in the Far East since the abrogation of the Anglo-Japanese Alliance thirteen years ago.

Being separated by a wide expanse of waters, America cannot perhaps be regarded as a neighbour in the same sense as Soviet Russia and China ; but in recent years—in fact, ever since she took over the Philippines from Spain after the war of 1898—she has taken an increasingly keen interest in Far Eastern affairs ; and it is she, more than any other country, that has so constantly stressed the importance of maintaining the principle of the Open Door and Equal Opportunity in China —an insistence and a principle that, to Japanese ears, always sounds strangely inconsistent in view of America's own strong stand on the Monroe Doctrine and on the Immigration Law of 1924, both of which keep " the Door " firmly closed to Japanese on the other side of the Pacific. If ever there should be a Japanese-American war it will be due solely to Japan's grievance regarding this American inconsistency. But this does not imply that Japan is ever likely to fight the United States in order to force them to give up either the Monroe Doctrine or the Immigration Law. To the Monroe Doctrine she has never raised any objections and, although the unfortunate discrimination shown against Japan in the Immigration Law has always rankled badly, Japan is never likely to resort to armed force merely in order to have the Law modified or rescinded. What it does mean is that if ever the United States, on the grounds of maintaining the principle of the Open Door and Equal Opportunity in China, should take ctive steps to interfere with Japanese policy in East Asia, Japan would most certainly oppose them with armed force. It is to be hoped that they

will never attempt such action, for if they did war would be inevitable. It is, moreover, the only circumstance in which a war between the two nations appears at all conceivable, despite the assertions of sensation-mongers to the contrary.

It is in order to rule out such a possibility that Japan is so insistent on the abolition of the present ratio system which, in Japanese eyes, not only implies her inferiority and therefore lowers her prestige, but also gives the United States a sufficient margin of strength to resort to active interference in the Western Pacific should they so desire. As one of the leading Japanese papers put it :—" We do not object to parity in mid-Pacific, but we do insist on a margin of superiority on our own side in home waters, for that is the only way to enjoy security in East Asia." The remark was called forth by the assertion of certain American Congressmen, as an argument in favour of the United States building up to full Treaty strength, that " Japan would not have invaded Manchuria or occupied Shanghai if the American Navy had been up to treaty strength." The implication was too obvious to pass unnoticed.

While, however, a Japanese-American war is only conceivable in the event of the United States being so ill-advised as to attempt active interference with Japan's vital and immediate interests in East Asia, the potentiality of Soviet Russia and China as enemies is certainly more serious. It is not merely their proximity that arouses Japan's anxiety regarding them, but—and more especially—the abnormal conditions existing within their borders. Both China and Soviet Russia, it is true, are considerably further from Japan than France and the Low Countries are from England. But whereas our own immediate neighbours on the European mainland are all more or less stable and law-abiding nations, the same cannot be said for Japan's immediate neighbours on the mainland of East Asia. China's instability and chaotic condition, combined with her inability to safeguard her own sovereign rights, are a constant menace to peace, while Soviet intrigue, accompanied as it is by active and insidious Communist propaganda, is a danger that is infinitely greater in East Asia, where Japan has such vital interests, than it is in those parts of Europe adjacent to the British Isles. The Marlborough wars of two hundred odd years ago, the Napoleonic wars, and the Great War of 1914–8, were all fought, in so far as we were concerned, to maintain the independence of the Low Countries lest a stronger Power should gain control of them and be in a position to launch attacks from them against ourselves. Holland and Belgium, however, were always ready to stand up for themselves in defence of their own sovereign rights and to co-operate with those who went to

their aid to enable them to do so. China, on the other hand, has never shown either the readiness or the ability to defend her sovereign rights, and it is because of this that Japan has, for long, felt so much anxiety about that neighbour—anxiety which has led her into actions which, though perfectly understandable in themselves, have given rise to so much misunderstanding and apprehension by reason of their clumsy and frequently maladroit handling.

It is not, as so many people seem to think, that Japan has territorial ambitions of her own in China, but that she is fearful of Russia taking advantage of Chinese instability and chaos to extend her control and influence over China, even to the extent of turning large parts of that country into virtual Soviet provinces as she has already done in the case of Outer Mongolia.

It was not pure altruism that made us fight three great wars for the independence of the Low Countries: it was the sheer necessity of having to safeguard our own security. Similarly it was not just altruism that made Japan fight China in 1894, Russia in 1904, and Chang Hsueh-liang in 1931: it was strategic necessity; and although the war of 1894 and the operations (apparently it is bad manners to call them war!) of 1931–3 in Manchuria were seemingly aimed at China, the fundamental cause in both instances was, as in the case of 1904, Japan's fear of Russian encroachments on China's loosely held territory—Korea in the one case, Manchuria in the other—for these encroachments presented a direct and dangerous threat to Japan.

And so we see Japan's three great neighbours:—China, unstable and chaotic, incapable of safeguarding her own sovereign rights, offering herself as a fertile field for Communist propaganda and an easy prey for Soviet encroachments; Soviet Russia, an ever-growing menace, both political and military; and the United States, far removed, free from territorial ambitions, but all too apt to interpret every move of Japan's in East Asia as a threat to the principle of the Open Door and Equal Opportunity, on which she is so insistent in the Far East, but which she will not tolerate on her own side of the Pacific.

Had the Anglo-Japanese Alliance remained in force, Japan's anxiety regarding Soviet Russia and China would not have become as acute as it has done, as the Alliance would have served as a check to both. Since the abrogation of the Alliance in 1922, however, China has shown herself all too ready to play off Britain and Japan against one another, while Soviet Russia has felt safe in exploiting this Chinese characteristic to her own advantage. During the years 1925–7, it was upon ourselves that the vials of Chinese wrath were poured, and the Soviet exploited the situation to the full. Then came Japan's turn and, although the

Soviet was unable to exploit Chinese sentiment against Japan in the same way that she had exploited it against Great Britain a few years earlier, she nevertheless utilized it once more to her own advantage. In the absence of the old alliance between England and Japan, she has had no hesitation in provoking Japan to the utmost, safe in the knowledge that if, as a result of this provocation, Japan lost patience and hit back, that country would no longer be in a position to count on British support. Incidentally it is well to note that Soviet Russia was careful to refrain from provocation until she had completed her own military preparations in the Far East and until she had assured herself that, in the event of provoking Japan into striking, she could make it appear to the World that Japan was the aggressor.

But it is not only in its effect on the Soviet and China that the termination of the Alliance has tended to increase the tension in, and instability of, the Far East. Arising out of the abrogation of that valuable instrument, we ourselves have had to increase our own naval commitments and expenditure in Far Eastern waters, and Japan's fears for the security of herself and her vital interests have been increased by the bogey of a possible Anglo-American combination against her. Following the abortive Three-Power Naval Conference at Geneva in 1927, these fears, it is true, were reduced to some extent, as it was clearly revealed that Britain and America were by no means so united in the matter of naval policy as the Japanese had hitherto imagined; but, though these fears have been quietened, they are by no means dead and their continued existence is in large part responsible for Japan's recent denunciation of the Washington Naval Treaty.

In order to understand the present position, however, it is necessary to turn once more to Soviet Russia and China. Up to 1929, Japan felt no immediate threat to her security in so far as these two were concerned. In consequence, she had carried out two successive and entirely voluntary cuts in the strength of her army, in 1922 and 1925 respectively. She had even felt safe in postponing the modernization of her army which, in the important matters of training and equipment, had fallen far behind the standard attained by the leading armies in Europe as a result of the Great War. Then came the Sino-Soviet clash in 1929. The ease with which the Soviet disposed of the Chinese, combined with the unexpectedly high discipline and efficiency shown by the Soviet troops and the advanced standard of their arms, equipment, and training, made a great impression on the Japanese military authorities. In consequence, they began to agitate for the immediate enforcement of their long-postponed programme of arms replenishment and modernization, and also for the completion of their railway com-

munications on the mainland. The Government of the day, however, being pledged to a policy of economy, would not sanction the replenishment programme, and the Mukden War Lord, Chang Hsueh-liang, barred the way to the construction of certain railways in Manchuria: railways upon which the Japanese set so much store in the event of a clash with the Soviet in years to come.

Being baulked in this way it was perhaps but natural that, in the following year—when naval agitation against the London Naval Treaty was brought into prominence by the resignation of Admiral Kanji Kato, Chief of the Japanese naval staff, who contended that national defence was endangered by the terms of that treaty—the army began to make common cause with the navy. It only required the outbreak of the Manchurian trouble in September, 1931—which was largely the outcome of Chang's continued refusal to accord Japan the rights she claimed under treaty for the construction of certain important strategic railways in Manchuria—to bring matters to a head, and the long-delayed army replenishment programme was finally sanctioned in March, 1933. Under this programme, the bulk of which should be completed by the Spring of 1936, the total number of divisions (seventeen) is to remain unaltered, and there will be but a small increase in personnel; but the proportion of troops maintained in Manchuria has been permanently increased (about 65,000 as against 10,500 prior to 1931); mechanization and modernization are being speeded up so as to make the army "as efficient as that of any Western Power," and increasing importance is attached to tanks and aircraft in order to counteract Soviet strength in these two arms.[1]

An unprejudiced examination of this programme should make it clear that it is primarily a precautionary measure, such as we ourselves or any other country similarly placed would most certainly adopt. It seems, in fact, to have been drawn up with the primary object of making up for lost time on account of the modernization of the Soviet army, and owing, too, to the increased responsibilities brought about by Japan's commitments under the Japan-Manchukuo Protocol of 1932 and by her withdrawal from the League a year later. In view of the fact that the Soviet has increased its Far Eastern army from a few tens of thousands to two hundred thousand or more since 1931, supported by large numbers of powerful aircraft, tanks, and chemical warfare units, and has erected a strong line of fortifications and defence works along the Manchurian border, the 65,000 Japanese troops spread over the

[1] *Vide* the creation of two tank regiments of some two hundred and seventy machines in all, and an expansion of the eight existing air regiments from twenty-six to thirty-five squadrons in all.

548,000 square miles comprising Manchukuo can hardly be regarded as excessive, even when one takes into consideration the ever-spreading network of railways which the Japanese are constructing for the dual purpose of economic development and rapid movement of troops to threatened points.

One outstanding feature of the Japanese naval and military programmes alike is the growing attention paid to air power. Under the army replenishment programme, the Army Air Force, as already noted, is to be increased from twenty-six to thirty-five squadrons during the three-year period 1933–6. Under the so-called First Naval Replenishment Programme, sanctioned in March, 1931, the number of naval air squadrons is to be raised from seventeen to twenty-nine by 1937 and provision is made for the addition of two more by 1938. Under the Second Naval Programme, sanctioned in March, 1934, a further increase of eight naval air squadrons during the four-year period 1934–8 is planned. By the Spring of 1938, therefore, Japan should have a total of thirty-nine naval air squadrons as against only seventeen at the time of the Naval Conference in 1930. In so far as the navy is concerned, this great expansion of air strength is intended to make good the loss to national defence brought about by the reduction and limitation of submarine strength in accordance with the provisions of the London Naval Treaty, while the expansion of the Army Air Force is the answer to the menace of air attack from Vladivostok.

While it is perhaps but natural that these naval and military programmes should cause misgivings and apprehension abroad, it should be clear, from what has been said above, that they have been drawn up primarily as a measure of precaution to meet possible attacks on, or active interference with, Japan's vital interests in East Asia. Even in the case of her Second Naval Replenishment programme, which has called forth considerable criticism on account of its provisions for bringing the Japanese navy up to full treaty strength by the end of 1936, there is good reason to believe that, despite its having been drawn up tentatively within a short time of the London Naval Treaty being concluded, the Japanese naval authorities would not have pressed for its immediate enforcement in full if it had not been for the announcement of the American naval building plans in June, 1933. In effect, therefore, it was Japan's answer to the United States in the matter of naval construction ; just the same as the long-postponed army replenishment programme, sanctioned in 1933, was Japan's answer to Soviet Russia's immense military and air expansion and progress.

THE INTERNATIONAL SITUATION

RECENT INTERNATIONAL INCIDENTS

HUNGARY AND YUGOSLAVIA

FOLLOWING on the assassination of King Alexander of Yugoslavia at Marseilles [1] the Yugoslav Government, on 22nd November, presented to the League of Nations a note charging the Hungarian Government with complicity in the murder on the grounds that the crime was committed by a terrorist gang whose headquarters had been traced to Hungary. On the 24th the Hungarian Government replied to the charges with a memorandum presented to the League of Nations, in which an immediate investigation of the charges was demanded. On the 28th the Yugoslav Government laid before the League a detailed memorandum explaining the charges brought against the Hungarian Government, and giving names of places and individuals who, it was alleged, were active in plotting against the Yugoslav Government. To these charges M. Eckhardt, Hungarian delegate to the League, then replied in detail.

The matter was discussed before the League Council on 7th December. M. Jevtitch, on behalf of Yugoslavia, renewed the charges against Hungary. M. Eckhardt again repudiated the allegations. M. Titulescu (Rumania) and Dr. Benes (Czechoslovakia) supported the Yugoslav claims.

Meanwhile the dispute was exacerbated by the action of the Yugoslav government in expelling Hungarian citizens from within its borders into Hungary on the expiry of their short-term permits of residence. Conditions on the frontier grew acute as food and accommodation in the frontier district was inadequate to provide for the influx of refugees into Hungary. Much hardship was inflicted on the expelled Hungarians, who were given inadequate time to prepare for such a move, and bitter resentment was caused in Hungary, although it was officially announced in Belgrade that not more than 2,975 Hungarian citizens out of a total of 27,000 resident in Yugoslavia had been ordered to leave that country.

On 10th December, when the controversy was threatening to bring

[1] See Journal for November 1934, p. 826.

France and Italy into the dispute, on opposite sides, a compromise was found on the following lines :—

(i) The Marseilles murder is universally condemned in strong terms, and international terrorism is reproved under Article 10 of the Covenant.

(ii) It was placed on record that certain Hungarian authorities had " at least by neglect " incurred certain responsibilities, and a full investigation is to be made.

(iii) A convention, proposed by the French Government, for the repression of international terrorism is to be discussed.

A Committee of Eleven, of which Mr. Eden is to be *rapporteur*, will proceed to study the question of combined international action against terrorists.

ITALY AND ABYSSINIA

For some time past there has prevailed a state of tension on the frontier between Abyssinia and Italian Somaliland. Late in September of last year an Anglo-Ethiopian Boundary Commission proceeded to set about delimiting the frontier between Abyssinia and British Somaliland : it was hoped that this example would be followed by the Abyssinians and Italians. At this juncture there took place an armed affray at the Italian Consulate at Gondar, in Northern Abyssinia, whereupon the Italians adopted a " firm " attitude towards the Ethiopian Government, demanding apologies and compensation. Meanwhile the Anglo-Ethiopian Boundary Commission on 5th December had reached the wells of Walwal, which lie in the debatable ground between Abyssinia and Italian Somaliland. Here another affray took place between the Abyssinian escort and some Italian native levies. The Italians again took a " firm " attitude, while the Ethiopian Government desired to refer the matter to arbitration under the Treaty of 1908.

The dispute as to the ownership of the Walwal wells meanwhile continues. Both sides claim the wells, basing their contention on somewhat obscure rights. As the frontier in this region has never been satisfactorily delimited, the whole matter depends on the interpretation of several treaties, namely the Tripartite Agreement of 1906 between Abyssinia, Britain and Italy ; the Italo-Ethiopian Treaty of 1908 ; the Covenant of the League of Nations ; and the Italo-Ethiopian Treaty of 1928. The position of the Emperor of Abyssinia, Haile Silassie, might be seriously affected by a decision at all adverse to his country.

THE WAR IN THE CHACO

In the late autumn Bolivia, in reply to the League of Nations inquiry, agreed to a cessation of hostilities in the Gran Chaco and to lay down her arms on condition that her dispute with Paraguay should be settled by conciliation and that reciprocal guarantees of security should be given. As Paraguay made difficulties over the question of sending a delegate to Geneva before a cessation of fighting could be arranged, the war continued.

On 17th November it was announced from the side of Paraguay that the Bolivian Fort Ballivian had been captured and that Paraguayan forces were advancing into Bolivia.

On 23rd January the Paraguayan forces stormed Fort Carandaiti. With Ballivian and Carandaiti in their hands, the Paraguayans are now beginning to make a concentric advance on Villa Montes, their main objective, in three columns from the North-East and East, and along the R. Pilcomayo from the South-East. Indeed it is reported that some Paraguayan units have already crossed the R. Parapiti and captured Santa Fé, 62 miles North of Villa Montes. It is now stated that this forward movement of the Paraguayans is approaching Villa Montes.

AN INTERNATIONAL POLICE FORCE

THOSE who believe that an International Police Force would be the most effective guardian of the peace of the world, are acclaiming the success which attended the introduction of foreign troops into the Saar territory during the recent plebiscite as proof that this is but the forerunner of their Utopia.

Like all idealistic internationalism, this notion should be subjected to the acid test of reality. To begin with, this little force was not an international one in the sense that an International Police Force would have to be. It did not exist beforehand in readiness to do the bidding of the League Council if or when required ; it was sent to the Saar by the respective Governments at the request—not by order—of the League for a specific, limited, and non-militant purpose. So far as the British force was concerned, it went to uphold the authority of a British Commissioner, and under a British general. The duties of General Brind's little command were simply those of backing up the local police in preserving order during a political crisis—a contingency which may arise in any country—because the Saar had no military force of its own. The composition of the force could in no way threaten the

security of neighbouring territory, apart from the fact that it was sent with the full concurrence of the most interested parties.

This is an entirely different state of affairs to the militant intervention of a great cosmopolitan force to counter the militant actions or intentions of one or more great Powers. It is not merely that the problem is greater; it is that the very existence of a so-called "International Police Force" would produce both a provocation and a potential means of aggression.

Germany and Japan have already shown that they are not prepared to submit vital national interests to a conclave of representatives of nations—including many minor nationalities—at Geneva. If an attempt was made to use an International Force to repress their interests by militant action, it is certain that either of these great nations would resist with all their strength. It is quite likely that they would not find themselves as isolated as protagonists of international action always seem to imagine. It is obvious that, from a purely military point of view, the I.P.F. would be a thoroughly unreliable and unsatisfactory command.

It is so often taken for granted that all the "good" nations will always be on the side of the "big battalions"; but let us suppose France conceived herself to be insulted or threatened and, through some such eventuality as that which occurred when a clerk at the Admiralty inadvertently declared war prematurely on Austria, a French air squadron started the conflagration. The "aggressive" neighbour is bombed before he has done more than be "insulting" or "threatening"—on which side is the I.P.F. to intervene; or is it, like the Army of Pacifists who proposed to stop the Sino-Japanese conflict a few years ago, to place itself between the rival armies and defy both sides to fire on the Peace Police?

Let us bring the matter nearer home and imagine that Britain has been indicted by a majority of national representatives, headed by the Soviet Union, perhaps, at Geneva; are we going to submit to our trade being paralysed by an International Naval Police? Alternatively, would we lend our Navy to form the backbone of such a force to coerce the United States or Japan although our own interests were not really involved?

Such situations may seem far-fetched, yet they are the logical potentialities of a policy dictated by idealism run riot. But the whole ridiculous notion of an International Police Force can be dispelled on account of far more definite and practical objections, so far as participation by the Commonwealth of British peoples is concerned. If it ever came to the point, there can be no question that any government

which proposed to place the British or Dominion fighting Services under "international" authority would not last a day, and no British officer or man who found an attempt being made to transfer him to such a force would serve in it for an hour. Voluntary legionaries of mixed nationalities there have always been, but that is an utterly different thing to compulsory service in an International Legion by members of His Majesty's Regular and Auxiliary Forces.

THE NAVAL CONVERSATIONS

AS forecasted in these Notes last quarter, the Naval Conversations in London with delegates from the United States and Japan proved most difficult. So much so that what amounted to a complete *impasse* was reached, and on 20th December they were formally adjourned for the foreign delegates to "make personal contact with their own governments." Officially it is proposed that they should be renewed at a future date; but until some common ground on which the naval Powers can meet has been found any further "conversations" can only accentuate existing differences.

THE WASHINGTON TREATY.

On 29th December, 1934, Japan gave formal notice of her intention to abrogate the Washington Treaty. She had previously invited Great Britain, the United States, France, and Italy—the other parties to the Treaty—to take similar action, but they declined.[1]

THE SAAR

TO British statesmanship and to the British Army more than to any other influences is due the fact that the thorny problem of the Saar territory was settled without the peace of Europe being threatened. But it is fair to say that both Germany and France also contributed greatly to this happy result by acquiescing in what amounted to predominantly British control of the plebiscite.

At the invitation of the League of Nations, an international force consisting of 1,500 British regular troops, 1,300 Italian Carabinieri, 280 Dutch Marines, and 250 Swedish Royal Guards arrived in the Saar territory by 22nd December, 1934. The force was under command of Major-General J. E. S. Brind, C.B., C.M.G., D.S.O., commander of the 4th Division. The British contingent was composed of the 1st Battalion

[1] See "Warship Construction Under the Naval Treaties," in this JOURNAL, p. 93.

Essex Regiment and the 1st Battalion East Lancashire Regiment. A few days later it was reinforced by a small detachment of armoured cars.

Under the directions of Mr. Knox, the British chairman of the governing Commission, with a police force, largely British in composition, backed by a military force under a British General to preserve order, the plebiscite took place on 13th January, 1935. Except for some trivial incidents, the voting was carried through peaceably. The result was announced on 15th January and showed that 90.36 per cent. of the voters were in favour of returning to Germany; 8.82 per cent. for the *status quo*; and 4 per cent. for union with France.

The German victory was even more complete than was anticipated, and was hailed with great delight by Hitler and his countrymen generally.

The result of the plebiscite was at once reported to the League Council; but their decision was temporarily held up by the French demands for drastic demilitarization of the Territory in accordance with the Versailles Treaty. What seemed to be the makings of another crisis passed, however, with concessions on both sides. On 17th January it was announced that the Council had formally decreed that the Saar should be returned to Germany on 1st March.

GERMAN REARMAMENT

EVER since the defection of Germany from the League of Nations, in October, 1933, there has been no doubt that German rearmament on some scale has steadily been in progress. It seems to have been taken for granted in Germany that the gesture of leaving the League was tantamount to a renunciation of the disarmament clauses of the Treaty of Versailles. Seemingly acting on the assumption that they had obtained in December, 1932, a recognition of their claim to increase the Reichswehr from 100,000 to 300,000 men, the German authorities proceeded to give effect to that claim. In April, 1934, the increase to the higher number was made by calling up 200,000 men for a term of eighteen months' service. Whether or not the original force of 100,000 men, serving on a 12-year engagement, has been modified is not very clear; neither has it been made in any way public as to what modifications in the organization of the Reichswehr this increase may involve. It is reported that the new organization would be on the basis of twenty-one divisions, one division being presumably allotted to each Army Corps region of 1914.

In addition it has become manifest that Germany is taking steps to re-form an air force, although these steps are not nearly so obvious since the Treaty of Versailles prohibited her from maintaining any type of military aircraft : consequently the whole process of any such rearmament has hitherto been carried out in a clandestine fashion. But sufficient evidence has accumulated to show that a German air force is in process of formation, also that it possesses between 600 and 1,000 aircraft suitable for warlike purposes.

The matter was brought before Parliament at the end of last November, when Mr. Winston Churchill moved an amendment to the Address on the King's Speech. He considered that the strength of the national defences, especially that of air defences, were no longer adequate. The Cabinet thereupon decided to make a public statement on the subject. Before doing so, however, H.M.'s Ambassador in Berlin, Sir E. Phipps, was instructed to make a statement to the German Government. He was to say that the increase in armaments and the formation of an air force were facts beyond dispute ; that H.M.'s Government viewed with grave concern the effect which these events might exercise on European apprehensions, the more so in that they were accompanied by a strong militaristic bias in German education ; it appeared to render most difficult an early settlement of international problems. Germany could not be absolved from the suspicion of entertaining bellicose views. Sir E. Phipps made his declaration to the German Minister for Foreign Affairs, and repeated it to Herr Hitler, the Chancellor, on 27th November. A like communication was made on the same day to the German Ambassador in London by the Secretary of State for Foreign Affairs, whilst copies of that statement were despatched to the French, Italian, Belgian, and United States Ambassadors.

The debate on Mr. Churchill's amendment took place on the 28th. Mr. Churchill was followed by Mr. Baldwin, who first alluded to the greatly increased estimates contained in the last German Budget, for military and air purposes. He then stated various facts connected with the increase of the German forces, which have already been related above. He believed that the new German army was being equipped with modern weapons, although he was unable to quote the nature and calibre of the artillery.

The Secretary of State for Foreign Affairs wound up the debate by stating that the problem presented by German rearmament was not an Anglo-German problem but a European problem. He hoped that the statements then made would clear up much uncertainty, anxiety, and suspicion.

FRANCO-ITALIAN RELATIONS

SINCE the Great War relations between France and Italy have often been strained, sometimes seriously so. The chief points at issue have arisen out of France's attitude towards Yugoslavia's anti-Italian policy, the unsatisfactory situation of the Italians in Tunisia, France's hesitation to carry out the provisions of the Pact of London of April, 1915, whereby Italy should receive some extension of colonial territory if French colonial possessions were enlarged at the expense of the German colonies,[1] and the growth of Italian nationalism in general. But it was the spirit behind these differences rather than the differences themselves which embittered feeling on both sides. The Press of both countries—and to-day the Press may often represent a serious danger to good international relations—kept up and intensified the bitterness and made a settlement difficult.

But during the last two years there has been a marked improvement in the tone of French public opinion towards Italy and vice versa. France has undoubtedly modified her encouragement of Yugoslavia and has shown no inclination to be drawn into a quarrel with Italy as the outcome of Balkan political differences. Moreover, anxiety began to be felt about the large sums lent to Yugoslavia, the repayment of which appeared more problematical than ever. On the other questions there were signs that France was beginning to recede from her attitude of always delaying a recognition of Italian claims. On the Italian side the public and the Press were becoming more friendly towards French affairs and policy. Accordingly, when M. de Jouvenel was sent to Rome as French Ambassador he started with a definite intention of promoting better relations with Italy, and owing to his important independent political position he was the better able to achieve results. Signor Mussolini met his advances more than half-way, and although de Jouvenel's embassy only lasted six months it contributed largely to improve Franco-Italian relations.

The advent to power of Herr Hitler in Germany and the Nazi attitude towards international problems caused alarm in France, and made the Government and public opinion even more inclined to conciliate Italy. Signor Mussolini's initiative for the Four-Power Pact thus found a more favourable reception than would otherwise have been the case; France and Italy, as well as Great Britain, realizing fully the importance of close collaboration for the maintenance of peace and of drawing Germany into an agreement. Germany's attempt to force

[1] Great Britain had fulfilled an undertaking of a like nature in 1924.

Nazi policy on Austria and thereby practically obliterate Austrian independence, and Italy's counter-move brought a Franco-Italian understanding ever nearer, and the Press of both countries showed a better comprehension of the problems and aspirations of the other.

Finally M. Barthou planned a visit to Rome to settle outstanding differences. Unfortunately he fell a victim to the Marseilles tragedy before achieving his end. But his death only postponed the settlement, and his successor, M. Laval, arrived in Rome early in January on the same errand. After discussions, not always easy, but never unfriendly, an agreement was arrived at on 7th January. France undertook to carry out rectifications of Italy's colonial frontiers, while the existing *modus vivendi* affecting the status of Italians in Tunisia was soon replaced by a regular and far more satisfactory treaty. France did not cede a portion of the Djibuti territory to Italy, as had been first suggested, but she has agreed to grant Italy a share in the Djibuti-Addis Abbaba railway. In Central Europe the two countries have agreed to collaborate for maintaining Austrian independence and to oppose any unilateral modifications of treaty obligations in the matter of armaments, while admitting the principle of equality of rights as laid down in the Declaration of 11th December, 1932.

The individual items of the agreement are far less important, although satisfactory, than the fact of the agreement itself., for it has undoubtedly cleared the air and marks a long step towards the general restoration of confidence which is the necessary premise to any real economic recovery. The result is said to be largely due to M. Laval's conciliatory spirit combined with Signor Mussolini's readiness to understand the difficulties and dangers of the situation.

EVENTS IN MANCHUKUO

AS already stated in the JOURNAL negotiations had long been on foot for the sale by the Soviet Union of the Chinese Eastern Railway to the State of Manchukuo.[1] It is now announced that this sale has been concluded, the price paid to Russia being 170,000,000 yen (Japanese), this being equivalent to over £9,900,000 (gold). Of this sum 30,000,000 yen (£1,750,000—gold) is being paid for compensation to the railway personnel to be dismissed. The delay in concluding the bargain is ascribed to the negotiations as to part payment being made to the Soviet Union in goods.

[1] See JOURNAL for November, 1934, p. 828.

This sale thus removes a fertile source of friction between the Soviet Union and the Far Eastern States. It will be recalled that a quarrel over this railway led to a Soviet armed invasion of Manchuria, without any declaration of war, in 1929. During the ensuing operations the Chinese were hopelessly outclassed. From 1931 till 1933 it then seemed as though the Japanese aspirations to control the railway might precipitate an armed clash between Japanese and Soviet forces.

In other respects the situation between Japan and the Soviet Union is less tense. There is no question but that the initiation of much more friendly relations between Poland and Germany, with the possibility of Germany sympathizing with Japan in the matter of her anti-Communist policy, has somewhat checked any Soviet proclivity to adopt a provocative attitude towards Japan in the Far East.

In South-Western Manchukuo Japanese and Manchukuo forces are pushing forward, thus annexing to Manchukuo a belt of territory that lies between the original reputed boundary of Manchukuo and the Great Wall of China. That district had hitherto been part of the Chinese Province of Chahar, but on occupying Jehol the Japanese, so it appears, stated that they considered the natural boundary of Jehol to be coincident with the Great Wall.

A further step forward is now being made by the Japanese and Manchukuo forces to the North of the belt named above: they are now claiming certain villages which unquestionably have hitherto been recognized as belonging to Chahar. It is alleged that their intention was no more than to expel certain Chinese militia forces from that district. The Chinese appear to have withdrawn their militia, but this does not seem to have prevented some fighting. Under cover of aeroplane bombing attacks, the Japanese have occupied Kuyuan and Tushchkov villages which lie in Chahar Province; but details of the affair are as yet hardly known. The matter is to be referred to arbitration.

In addition, on the north-western frontier of Manchukuo, fighting has taken place between Manchukuo and Japanese forces on the one hand, and Mongolian troops on the other. Precise details are not yet to hand; each side claims that it was the victim of aggression.

CORRESPONDENCE

[*Correspondence is invited on subjects which have been dealt with in the* JOURNAL, *or which are of general interest to the Services. Correspondents are requested to put their views as concisely as possible, but publication of letters will be dependent on the space available in each number of the* JOURNAL.—EDITOR.]

THE PORT OF LONDON AUTHORITY

TO THE EDITOR OF THE R.U.S.I. JOURNAL.

SIR,—Sir David Owen's interesting lecture on the Port of London Authority suggests some other points of importance connected with the ports of England and supplies from overseas in general.

It must be obvious that our ports are the " bottle-necks " of our ocean commerce; it follows that the facilities for the disembarkation of cargoes must be adequate in all details, since it is a well-known fact that a ship can always discharge her cargo more quickly than the quays can be cleared, despite the most up-to-date mechanical and other devices that may be supplied. There are eleven principal ports in the United Kingdom, viz.: London, Liverpool, Manchester, Southampton, Hull, Newcastle, Cardiff, Bristol (including Avonmouth), Glasgow, Leith, and Dundee. In addition there are, of course, a great number of other ports serving the trades contiguous to them. It is of vital importance that, in the event of war, the Admiralty, War Office, and Air Ministry should bear fully in mind the necessity of ships discharging their cargoes at their particular ports of destination. It has frequently been said that it is as useless to send a ship, destined to a South Wales port, to discharge her cargo of, say, pit props to London, as it is to send a ship destined to London to discharge, say, her meat or chests of tea at a South Wales Port; for the chests of tea or meat carcases cannot be used to prop up the mines, any more than the population of London, and the southern and eastern counties that it serves, can be fed on pit props. In addition to this, of course, there is the question of insurance, deviation of voyage, and lack of facilities for dealing with specific cargoes other than at the particular ports to which the ship is destined by contract with the cargo owners: all highly important factors in maintaining the " flow of trade."

It is the duty of the ports adequately to serve the trade of the area immediately adjacent and the hinterland thereof, and each port is equipped with the necessary gear to deal with the cargoes of such areas; for instance, Middlesbrough has to deal with cargoes of iron ore; London, Liverpool, Avonmouth, etc., with grain. London may be said to be the most universally equipped for all cargoes other than iron ores.

The eight essentials of a port are:—

(1) Convenience to markets.
(2) Adjacent waters of sufficient depth of channel for the safe navigation of ocean-going ships.
(3) Adequate quays, with sufficient water to ensure safe mooring alongside.

(4) Adequate transit sheds for both import and export cargoes, with open and covered quay space for storage and sorting of cargoes.
(5) Adequate rail and road sidings, tugs, barges, lighters, etc.
(6) Sufficient skilled labour of specific categories.
(7) Dry docks, and facilities for the maintenance and repair of ships; and
(8) Sufficient export trade to create an automatic supply of empty freight cars (rail or road) for the clearance of imports.

The Port of London is unique, in that it draws imports from, and passes imports outwards to, practically every other port in the United Kingdom.

It is seldom appreciated by people, other than those intimately connected with our ports, that the whole of our organization of transport is so constituted that the distribution of essential foodstuffs and raw materials is governed by the time taken in passing them through the ports; it was only when the general strike took place some years ago that the nation generally realized that it was not possible to obtain essential foods and other commodities for any length of time without the railways being fed from the ports: this, if for no other reason than that the greater part of our storage accommodation is clustered around the ports; indeed, Birmingham is, I believe, the only inland city that has anything in the nature of a large cold storage.

HAROLD B. TUFFILL,

21*st January*, 1935. *Paymaster Commander, R.N.R.* (*Retired*).

THE MILITIA

TO THE EDITOR OF THE R.U.S.I. JOURNAL.

SIR,—Public attention was recently focused on Lord Ampthill's plea, made in the House of Lords, for the revival of the Militia, or People's Army as it used to be called. His case was that although we have, in the Territorial Army, a reserve army, we have no adequate reserves with which to bring the Regular Army up to strength and replace casualties in the field, since the Territorial Army cannot, under its constitution, be used for drafting to the Regular Army, or for foreign service.

The Minister of War's reply was most unconvincing, and in fact disquieting. First, he said that the revival of the Militia would be too expensive, " otherwise I should be glad to see a revival of the Militia." Secondly, he led us to believe that he had some hidden force (of which no numbers or details were given) up his " military sleeve " for production at the moment when military exigencies should demand. The general tenor of his reply was, " Don't worry; leave this matter to the experts —who would do differently if they could afford to do so! "

Is the public to be satisfied with this reply? Why the two statements? If this hidden force is sufficient, why would the Minister like to revive the Militia if only he had the money? One or the other force must be redundant. Figures concerning " other ranks " of this hidden reserve were not disclosed by the Minister, but those concerning officers are in the Army List for all to see. I have no hesitation in describing them as utterly inadequate.

To those who know, it is patent that between the Regular Army and the Territorial Army there is but the thinnest line of Regular Army reservists and the Supplementary Reserve, composed mainly of technical and non-combatant arms. Adequate man-power is essential, and until the Minister of War can be more factually con-

vincing it will be the aim of many of us to urge that the Militia, or Special Reserve, should have an existence in fact, and not merely on paper.

The primary duty of the old Militia was to provide infantrymen—the backbone of an army. It was recruited mainly from country workers, to the vast bulk of whom service in the Territorial Army is quite impossible, and from the humbler town workers such as dockers and market porters, to whom the Territorial Army is for social reasons a little forbidding. This excellent man-power—especially for infantry service—is at present untapped, given no opportunity for service, wasted. Yet no war can be won and no country defended without the infantryman—the man with the rifle and bayonet, plus the ability to use them. Tanks, aeroplanes, artillery and other specialized arms are very necessary adjuncts, but they cannot of their own accord gain an objective or, conversely, repel an attack, *in toto*.

We are at the moment specially vulnerable; stripped naked in a vain sacrifice for universal disarmament. Nothing could be more likely to tempt foreign Powers to endanger peace than the spectacle of our military weakness. It is common knowledge that every country in Europe is re-arming rapidly except ourselves, and it should be no more than an elementary precaution on our part to make our armed forces proportionate to the Imperial responsibilities we bear.

Lord Hailsham pleaded poverty. As well plead inability to pay one's fire insurance

S. E. Massy Lloyd,
Brigadier-General,
Chairman, Militia Club.

Ipswich, *25th January*, 1935

A COMPULSORY TERRITORIAL ARMY

To the Editor of the R.U.S.I. Journal.

Sir,—In your August number appeared an article by Major Carlton Hall entitled "British Re-armament." This article has been followed by letters from the same writer in the Press.

It is never pleasant to differ from a fellow Territorial, but I regret to say that I differ from Major Hall on nearly every one of his points. Space, however, prevents at the moment a reply to more than one argument. His suggestion as to a "compulsory Territorial force" embodies an idea which is from time to time mentioned in the ranks of the Territorial Army, and I think it might be well to point out objections to the scheme. The idea is, of course, no new one. It got as far as a Bill in the House of Commons, "The National Military Training Bill of 1908." There were, however, in those days some slight excuses, because men were thinking in terms of a large-scale military invasion of this country. To-day it is realized that invasion, other than by air, would mark the end of a war, not its commencement. In other words, it would mean that our Navy had lost control of the approaches to our coast, in which case the country would be in a bad state.

It was pointed out long ago, by Mr. Belloc among others, that continental countries adopted conscription because it was the only method which gave them a large force of men to cover long land frontiers. Conscription does not necessarily provide a good army, and it certainly does not provide a professional army for overseas garrisons. It does, however, provide an army large in terms of man-power.

It is a very inelastic system, the good and the bad, the keen man and the dullard, all commence service together, and, except such as choose to be professional N.C.Os., all finish service together. There is obviously no room for the volunteer spirit.

Major Hall is of the opinion that " whether we choose the Prussian or the Swiss model matters comparatively little." Now neither of these models bears the slightest relation to the problems which we in this country have to face. The Swiss system is perhaps the ideal model for a small nation intent above all else on preserving the sanctity of her land frontiers. It is a pure militia, men trained from 65–92 days the first year, and for 13 days for about six years afterwards. In other words, they do a little more training than the specialists in the Territorial Army. Out of a population of four million the annual class is 25,000. So long as men are liable for service with the Colours they keep their personal arms and equipment at home. It is essentially an organization for local defence. There is no permanent professional army save a small corps of instructors. Above all, it is largely an army of riflemen ; an excellent defence force in a difficult terrain. And it is quite clear that Switzerland would only be called upon to wage one kind of war to defend her own frontiers.

The German system, which is, in effect, the system adopted to-day by France, Poland, and most other continental nations, was specifically designed to provide a large standing army, and once again was devised for one type of war only. The whole pre-War German system had for its aim the immediate mobilization of a marching host and the deployment along her frontiers of the maximum possible number of men within the first fourteen days of mobilization.

Comparing the problems of these two countries with those of Great Britain, it is quite clear that entirely different factors have to be taken into account. Every British soldier must go to war across the seas. It therefore follows that the rate of deployment of our armies is conditioned, not only by mobilization arrangements, but by transport arrangements. Large bodies of men maintained during peace-time would be of little value to us. What is required is a very elastic organization for the development of our army in any one of several possible ways. Such an organization can certainly best be built up on the volunteer system. Critics who, despairing of the present acknowledged weak strength of the Territorial Army, wish to plunge into conscription have lost their sense of proportion. Mr. Arnold Foster in 1904 published an estimate giving the cost of the introduction of conscription into this country. His figures were £25,900,000 per annum. In the absence of equivalent figures for to-day these figures of Mr. Arnold Foster may be accepted as a rough guide. The Territorial Army has been completely starved for several years past, largely owing to financial difficulties, partly because it was not thought that it would be required at an early date. A fraction of the sum estimated by Mr. Arnold Foster, if applied in support of the volunteer system, would give us in the Territorial Army that organization of officers, N.C.Os., and instructors which is not only inexpensive and suitable to the traditions of this country, but is actually the most suitable military machine for a great number of our present problems.

Sevenoaks,
November, 1934.

JOHN K. DUNLOP,
Lieut-Colonel, T.A.

GENERAL SERVICE NOTES

IMPERIAL DEFENCE

EXPANSION OF THE ROYAL AIR FORCE

On 28th November last Mr. Winston Churchill moved an amendment to the King's Speech to the effect that " . . . the strength of our national defences, and especially of our air defences, is no longer adequate to secure the peace, safety, and freedom of Your Majesty's faithful subjects."

In his reply for the Government, Mr. Baldwin gave such particulars as he could of Germany's efforts to re-form an air force.[1] He also informed the House of Commons as to the present strength of the Royal Air Force and the progress made in giving effect to the expansion of that Service approved in July, 1934.[2]

The first-line strength of the regular units of the Royal Air Force to-day, he said, was 880 aircraft at home and overseas. Of these, including the Fleet Air Arm, 560 are at present stationed in the United Kingdom. There were also at home the auxiliary Air Force and the special reserve squadrons, with 127 aircraft, making nearly 690 aircraft " available to-day in the United Kingdom that could be put in the first line." There was also, behind these 880 first-line aircraft, a far larger number, either in reserve or in use for training and experimental work.

At the moment there was no ground for panic, but, looking ahead, there was ground for " very grave anxiety." The present approved programme of expansion provided for a very substantial portion of the whole programme being completed in the next two years. In the years 1935 and 1936 it was proposed to form twenty-two squadrons for home defence, and in addition three squadrons for the Fleet Air Arm, " which is an integral part of the Royal Air Force." These twenty-five squadrons were additional to the four already forming in the current year (1934). By 1936 our first-line strength would be increased by some 300 aircraft over the present figure. Behind these would be a large (but unspecified) number in reserve.

Sites had been selected for eleven new aerodromes, six of which had been or are in process of being acquired. Plans for increasing or altering forty existing stations were well advanced.

An additional flying training school had been opened, and another would open in April. The number of short-service officers was being increased; the number of civil pilots entered for the reserve would be increased by 100 per cent. in 1935. There would also be an increase of 100 per cent. in the aircraft apprentices entered at Hornton.

To train a pilot for military flying took twelve months for the flying; after that

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[1] See " German Re-armament," p. 168 of this JOURNAL.

[2] See " Air Notes " in the JOURNAL of August, 1934, p. 631.

he had a great deal to learn in the way of night flying, navigation, and gunnery. The work of a pilot in the civilian service and that of the man who had to go into action against an enemy were not comparable.

Our latest fighter aircraft had a speed of 230 m.p.h., and yet newer types would show a remarkable further advance in speed and general performance.

THE FLEET AIR ARM.

It will be noted that in computing the available strength of first-line aircraft Mr. Baldwin included the Fleet Air Arm, which he described as " an integral part of the Royal Air Force." This definition is only partly true even from an administrative point of view. From an operational point of view, the Fleet Air Arm is an integral part of the fleet and, unless the efficiency of the fleet is to be destroyed, it can no more be removed for any other service than the guns of the ships could be removed and turned over to the Army.

The fact is that the Fleet Air Arm is being counted twice over—by the Admiralty as a fleet unit, and by the Air Ministry as being available for the air defence of the country. This state of affairs is not only misleading to the nation, but a source of weakness to Imperial defence.

UNILATERAL DISARMAMENT.

In closing the debate alluded to above, Sir John Simon–Foreign Secretary, said that, speaking from long experience of Geneva, he was completely convinced that our anticipation of that which all nations ought to have joined in doing—disarming ourselves in advance by ourselves as a way of example—had not increased our strength in the Council of Geneva. Other people talked with an air of superiority now. It was not what the Americans would call a good talking point.

NAVY NOTES

GREAT BRITAIN

H.R.H. The Prince of Wales.

Vice-Admiral H.R.H. The Prince of Wales, K.G., K.T., K.P., G.C.S.I., G.C.M.G., G.C.I.E., G.C.V.O., G.B.E., M.C., to be Admiral in His Majesty's Fleet, to date 1st January, 1935.

Flag Appointments.

The Home Fleet.—The King has been pleased to approve the appointment of Admiral Sir Roger R. C. Backhouse, K.C.B., C.M.G., to be Commander-in-Chief, Home Fleet, in succession to Admiral the Earl of Cork and Orrery, K.C.B., to date August, 1935. Admiral Backhouse was relieved as Vice-Admiral Commanding 1st Battle Squadron, and Second-in-Command, Mediterranean Fleet, on 21st May, 1934. Admiral Lord Cork has been Commander-in-Chief, Home Fleet, since 14th September, 1933.

Plymouth Command.—The King has been pleased to approve the appointment of Vice-Admiral the Hon. Sir Reginald A. R. Plunkett-Ernle-Erle-Drax, K.C.B., D.S.O., to be Commander-in-Chief, Plymouth, in succession to Vice-Admiral Sir Eric J. A. Fullerton, K.C.B., D.S.O., M.A., to date 11th June, 1935.

Rear-Admiral, Gibraltar.—Rear-Admiral J. M. Pipon, C.M.G., M.V.O., O.B.E., has been appointed Rear-Admiral in Charge and Admiral-Superintendent, H.M. Dockyard, Gibraltar, with the short title of "Rear-Admiral, Gibraltar," in succession to Rear-Admiral F. M. Austin, C.B., to date 20th April, 1935, and to assume command about 14th May, 1935.

First Cruiser Squadron.—Rear-Admiral Geoffrey Blake, C.B., D.S.O., has been appointed Rear-Admiral Commanding First Cruiser Squadron, in succession to Vice-Admiral J. K. im Thurn, C.B., C.M.G., O.B.E., to date July, 1935. Rear-Admiral Blake is due to vacate office as Fourth Sea Lord and Chief of Supplies and Transport on 15th February, where Rear-Admiral P. L. H. Noble, C.B., C.V.O., will succeed him.

Third Cruiser Squadron.—Rear-Admiral G. H. D'Oyly Lyon has been appointed Rear-Admiral Commanding Third Cruiser Squadron, in succession to Rear-Admiral H. J. S. Brownrigg, C.B., D.S.O., to date 15th March, 1935, and to assume command about 9th April.

Second Cruiser Squadron.—Rear-Admiral S. J. Meyrick, C.B., late Naval Secretary to the First Lord, succeeded Rear-Admiral P. L. H. Noble, C.B., C.V.O., in command of the Second Cruiser Squadron, Home Fleet, on 14th December.

East Indies Station.—Vice-Admiral F. F. Rose, C.B., D.S.O., assumed command at Colombo on 12th December of the East Indies Station, in succession to Vice-Admiral Sir M. E. Dunbar-Nasmith, V.C., K.C.B.

Rear-Admiral (S).—Rear-Admiral C. P. Talbot, C.B., D.S.O., was relieved as Director of Naval Equipment on 10th December by Rear-Admiral St. Aubyn B. Wake, and on the same day succeeded Rear-Admiral N. F. Laurence, C.B., D.S.O., as Rear-Admiral (S) at Blockhouse.

AMERICA AND WEST INDIES.—Vice-Admiral the Hon. Matthew R. Best, C.B., D.S.O., M.V.O., succeeded Vice-Admiral the Hon. Sir Reginald A. R. Plunkett-Ernle-Erle-Drax, K.C.B., D.S.O., as Commander-in-Chief, America and West Indies, on 21st November, 1934.

FLAG LIST CHANGES.

Consequent on the vacancy on the Rear-Admirals' list caused by Rear-Admiral A. E. F. Bedford, C.B., assuming command of the Royal Indian Navy, Captain Hector Boyes, C.M.G., C.I.E., A.D.C., was promoted to Rear-Admiral, to date 23rd November, and placed on the retired list, 24th November; Captain G. W. Taylor, A.D.C., was promoted to Rear-Admiral, 24th November, and placed on the retired list, 25th November; and Captain G. H. D'Oyly Lyon, A.D.C., was promoted to Rear-Admiral, to date 25th November.

Consequent on the death of Rear-Admiral R. C. Dalglish, C.B., on 17th December, Captain R. M. King, D.S.O., A.D.C., was promoted to Rear-Admiral, to date 18th December, and placed on the retired list, 19th December; and Captain (Commodore, 1st class) T. F. P. Calvert, D.S.O., A.D.C., was promoted to Rear-Admiral, 19th December. Rear-Admiral Calvert was reappointed as Chief of Staff, Home Fleet, on his promotion.

Vice-Admiral Sir Humphrey T. Walwyn, K.C.S.I., C.B., D.S.O., was placed on the retired list, to date 15th December, 1934; but, as he was supernumerary to the Flag List, no vacancy occurred in consequence of his retirement.

Admiral Sir Lionel G. Preston, K.C.B., was placed on the retired list at his own request, to date 16th January, 1935. In consequence, Vice-Admiral Sir A. Dudley P. R. Pound, K.C.B., was promoted to Admiral; Rear-Admiral John K. im Thurn, C.B., C.M.G., C.B.E., to Vice-Admiral; and Captain J. A. G. Troup, A.D.C., to Rear-Admiral, from the same date.

Rear-Admiral D. B. Le Mottée was placed on the retired list at his own request, in order to facilitate the promotion of younger officers, to date 3rd January, 1935, and in consequence Captain (Commodore 2nd Class) Geoffrey Layton, D.S.O., A.D.C., was promoted to Rear-Admiral, to date 24th January, 1935.

PERSONNEL.

CHAPLAINS' CONDITIONS OF SERVICE.—Revised conditions of service have been approved for Chaplains, R.N., entered on or after 25th December, 1934. These conditions provide for increased rates of full pay throughout the scale, but involve a reduction in the age and service scale of retired pay, and in the amount of withdrawal gratuities. The former lowest scale of pay, 15s. 4d. a day on entry, is abolished. The scale of 18s. a day, payable after three years, has become the rate on entry; 23s. 4d. a day, formerly payable after six years, has become the rate after three years; 26s. 2d. a day, formerly payable after nine years, has become the rate after six years, and so on. The maximum of 45s. a day is attainable after twenty-seven years instead of thirty as hitherto, and a new maximum rate of 47s. 8d. a day is introduced for chaplains after thirty years.

NEW CONDITIONS FOR MEDICAL OFFICERS.—Short-service medical officers entered before 1st May, 1934, and medical officers on the permanent list with less than four years' full-pay service (excluding civil hospital time) on 1st May, 1934, who have not already done so, are required to report not later than 31st March, 1935, through the usual Service channels, whether or not they desire to accept

the revised conditions of service (summarized in the August, 1934, issue of the JOURNAL).

PRIZE AWARDS.—The Jackson-Everett Prize for signals specialists has been awarded for 1934 to Lieutenant the Hon. D. C. Cairns, R.N., H.M.S. "Nelson."

Paymaster Sub-Lieutenant J. Charles, R.N., H.M.S. "Devonshire," has been awarded the Gedge Memorial Medal and Prize for 1934.

SALUTES WHEN DRIVING.—Salutes by officers and men riding bicycles or driving motor vehicles will in future be made in the ordinary way with the hand, "if the state of the road and traffic conditions permit," instead of turning the head towards the officer being saluted. This regulation does not apply to Royal Marines, wherever serving.

OFFICERS' UNIFORMS.—Their Lordships have approved that the list of officers' uniform dresses shall be renumbered as follows:—1, full dress; 2, ball dress; 3, frock coat and epaulettes dress; 4, frock coat dress; 5, undress; 6, mess dress; 7, mess undress; 8, white full dress; 9, white dress; 10, white undress; 11, white mess dress; and 12, white mess undress. White dress was formerly No. 8a; white undress No. 8b; white mess dress No. 9; and white mess undress No. 10.

EXERCISES AND CRUISES.

HOME FLEET.—The spring cruise began on 14th and 15th January, and as in the previous year included West Indian ports. The contingent selected for the West Indies was larger than in any past year, and included the battleships "Nelson," "Rodney," "Barham," and "Valiant"; the cruisers "Orion," "Leander," "Achilles," "Neptune," and "Cairo"; the leader "Exmouth" and destroyers "Esk," "Escort," "Electra," "Echo," "Eclipse," "Escapade," and "Encounter"; and the netlayer "Guardian." The ports to be visited were St. Vincent, Barbados, Grenada, St. Kitts, Trinidad, Dominica, Antigua, St. Lucia, and Dominica. "Force A," as this was known, parted company from the rest of the Fleet at Arosa Bay on 20th January, and "Force B," the remainder, proceeded to Gibraltar. Combined exercises between Home and Mediterranean Fleets are to be held between 8th and 16th March.

MEDITERRANEAN.—The Mediterranean Fleet carried out a winter cruise to Corfu and other Greek ports from 10th to 25th January. The cruisers "London" and "Devonshire," under Rear-Admiral J. K. im Thurn, left Malta three days earlier and visited the Black Sea, calling at Varna and Constanza. The "London" also visited Constantinople.

EAST INDIES.—The first cruise of Vice-Admiral F. F. Rose, C.B., D.S.O., as Commander-in-Chief was to the Persian Gulf during January. On returning to Bombay at the end of that month his flag was to be transferred from the "Hawkins" to the "Emerald," and the former was ordered home. The "Norfolk" will replace her as flagship about March.

CHINA.—The flagship "Kent" was at Hong Kong from November to January, when she began a cruise to Manila. The 8th Destroyer Flotilla, after being reconstituted at Singapore with "D" class destroyers, visited Manila from 28th December to 1st January.

AFRICA.—All ships on the African Station were at Simonstown for Christmas and the New Year. The "Dorsetshire" was ordered to leave on 23rd January for Devonport to recommission, and in the summer the new cruiser "Amphion" will replace her as flagship.

AMERICA.—Except for the "Exeter," at Valparaiso, all ships on this station spent Christmas and the New Year at Bermuda. Between January and April the "York," "Danae," "Dragon," and "Scarborough" will cruise in the West Indies, meetings taking place with the Home Fleet; and the "Dundee" will go to Trinidad and South America.

NEW CONSTRUCTION.

THE 1934 PROGRAMME.—The following is the list of ships of the 1934 programme, with the names chosen for them, and details of their construction so far as contracts have been awarded:—

Cruisers ("Southampton" class).—"Glasgow," by Messrs. Scotts Shipbuilding and Engineering Co., Ltd., Greenock; "Sheffield," by Vickers-Armstrong, Ltd., Walker-on-Tyne (machinery at Barrow); "Birmingham," by Devonport Dockyard (machinery by John Brown and Co., Ltd.)

One *cruiser* ("Arethusa" class), "Aurora," by Portsmouth Dockyard (machinery by Wallsend Slipway and Engineering Co., Ltd., Wallsend-on-Tyne).

Aircraft Carrier.—"Ark Royal," by contract. (The old seaplane-carrier "Ark Royal" has been renamed "Pegasus.")

Flotilla Leader.—"Hardy," by Cammell Laird and Co., Ltd., Birkenhead.

Destroyers ("Hero" class).—"Hero" and "Hereward," by the Parsons Marine Steam Turbine Co., Ltd., Wallsend-on-Tyne (hulls by Vickers-Armstrong, Walker-on-Tyne); "Hasty" and "Havock," by William Denny and Bros., Ltd., Dumbarton; "Hostile" and "Hotspur," by the Scotts' Shipbuilding and Engineering Co., Ltd., Greenock; "Hunter" and "Hyperion," by Swan Hunter and Wigham Richardson, Ltd., Wallsend-on-Tyne.

Minelayer Submarine ("Porpoise" class).—"Rorqual," by Vickers-Armstrong, Ltd., Barrow-in-Furness.

Submarines ("Swordfish" class).—"Spearfish," by Cammell Laird and Co., Ltd., Birkenhead; "Sunfish," by Chatham Dockyard.

Sloops ("Grimsby" class).—"Aberdeen" and "Fleetwood," by Devonport Dockyard.

Sloop Minesweepers ("Halcyon" class).—"Niger" and "Salamander," by J. S. White and Co., Ltd., Cowes.

Coastal Sloops ("Kingfisher" class).—"Mallard" and "Puffin," by contract.

Netlayer.—"Protector," by contract.

Surveying Ship.—"Stork," by contract.

Boom Gate Vessels.—"Dowgate" and "Ludgate," by contract; boom working vessel, "Dunnet," by contract.

Submarine School Tender.—"Dwarf," by contract.

Trawler.—"Basset," by contract.

THE 1933 PROGRAMME.—It has been decided that cruisers of the latest type (9,000 tons) shall be named after important cities, and accordingly the two vessels of that type included in the 1933 construction programme have been renamed as follows:—"Minotaur," building at Vickers-Armstrong on the Tyne, renamed "Newcastle"; "Polyphemus," building at John Brown's, on the Clyde, renamed "Southampton." The name "Southampton" has been substituted for "Minotaur" as the class name for vessels of this type.

The flotilla leader " Grenville " was laid down by Messrs. Yarrow and Co., Ltd., on 29th September, 1934. The remaining destroyers of the " Greyhound " type were laid down in the autumn.

The first of the five sloops of the 1933 programme to take the water was the " Enchantress," at the Clydebank yard of John Brown and Co., Ltd., on 21st December. This is the first of a new type of convoy sloops, slightly heavier and faster than other post-War types. The displacement is 1,170 tons; the speed, 18 knots; and the armament includes three 4.7-in. and twelve smaller guns. This ship is to be adapted for use as the Admiralty Yacht and, as such, will replace the existing ship of that name.

Two sloops of the " Grimsby " type were included in this programme. The " Londonderry " was launched at Devonport Dockyard on 16th January. The " Deptford " was to be floated out of dock at Chatham on 5th February. The coastal sloop " Kingfisher " was to be launched by the Fairfield Shipbuilding Co., Ltd., Govan, on 14th February. She is much smaller than other types—585 tons, 20 knots and armed with one 4-in. gun.

THE 1932 PROGRAMME.—Some of the smaller units of this programme have now been completed. The destroyer " Fearless " was commissioned for trials at the yard of Cammell Laird and Co., Ltd., on 19th December, and left for Devonport next day. Her sister ships are due for completion at various dates in February, March and April.

The submarine " Salmon " commissioned for trials and service at the works of Cammell Laird and Co., Ltd., Birkenhead, on 5th January.

The sloops " Lowestoft " and " Wellington," built at Devonport Dockyard, were commissioned there for service on 20th November and 22nd January respectively. The " Lowestoft " left Plymouth on 3rd December, visited Lowestoft from the 5th to 8th, and then proceeded to China to replace the " Bridgewater." The " Wellington " was due to leave early in February to replace the " Laburnum " in New Zealand.

The minesweeping sloops " Harrier " and " Hussar," commissioned at Chatham on 9th November and 16th January respectively, to relieve the " Albury " and " Sutton " in the First Minesweeping Flotilla.

THE 1931 PROGRAMME.—All units of this programme have been completed except the three cruisers. The " Ajax " (Vickers-Armstrong) is ordered to leave Barrow for Portsmouth on 2nd April. The " Arethusa " (Chatham Dockyard) should be completed in May; and the " Amphion " (Portsmouth Dockyard) in July.

THE FLEET AIR ARM

NEW AMPHIBIAN AIRCRAFT.—A Supermarine " Seagull " amphibian aircraft, the first for general service in the fleet, has been embarked in H.M.S. " Nelson," and a crane has been fitted on board for its operation.

NEW T.S.R. AIRCRAFT.—The new Blackburn " Shark " aircraft type, which combines the functions of a torpedo bomber and a spotter reconnaissance aircraft, has been issued to No. 820 Squadron for H.M.S. " Courageous." The machines were not in time for the spring cruise.

MEDITERRANEAN TRAINING.—As in previous years, the " Courageous " and " Furious " left Portsmouth on 8th January for the Mediterranean, to be attached to the Fleet there until March.

China Station.—The " Hermes " arrived at Singapore on 26th December from England, to relieve the " Eagle." The " Hermes " took out the new No. 824 Squadron (nine " Seal " aircraft), and embarked from the " Eagle " No. 803 Squadron (six " Osprey " aircraft).

Mediterranean Station.—The " Eagle " left Singapore on 31st December for Malta, to join the Mediterranean Fleet temporarily. She brought with her from China No. 825 Squadron (six Fairey III.F. aircraft), and there was awaiting her at Malta No. 812 Squadron (twelve " Baffin " aircraft), disembarked from the " Furious " in October.

R.A.F. Personnel Afloat.—The Air Ministry have agreed that R.A.F. personnel posted to Fleet Air Arm flights for service in ships other than aircraft carriers shall be allocated to individual ships, and shall normally remain in them for the full period of the commission.

Their Lordships have decided that in future flight sergeants (except sergeant-major), sergeants, R.A.F., and naval fleet air arm ratings of equivalent rank borne for duty in aircraft carriers are to form a separate mess.

ROYAL MARINES

Dress Regulations.—Their Lordships have approved that the list of Royal Marine uniform dresses for N.C.Os. and men should be renumbered as follows:—1, review order; 2, undress order; 3, drill order; 4, night clothing; 5, fatigue; 6, review order, khaki drill tunic and trousers; 7, undress order, khaki drill; 8, drill order, khaki drill; 9, overalls; 10, marching order, blue; 11, marching order, khaki drill; 12, marching order, khaki service dress; and 13, as for No. 12 but with khaki drill.

Officers, R.M., on duty with troops will wear the dress corresponding to that worn by their men, but on other occasions the dress appropriate to that worn by officers, R.N.

DOMINION NAVIES

ROYAL AUSTRALIAN NAVY

Cruiser Exchange.—The " Australia " was placed under the orders of the Admiralty from 10th December, as an exchange cruiser, and H.M.S. " Sussex," which had conveyed H.R.H. the Duke of Gloucester to Melbourne for the centenary celebrations, came under the orders of the Commonwealth Government. The " Australia " left Brisbane on 10th December for Wellington, conveying the Duke of Gloucester, and will proceed to England via the Panama Canal, Jamaica, and Bahamas.

H.M.A.S. " Brisbane " to be sold.—Completed in October, 1916, the " Brisbane " will commission on 2nd April, 1935, for passage to the United Kingdom for preparation for sale. She will bring the balance crew for the new cruiser " Sydney," due for completion on the Tyne in August.

Miscellaneous.—The surveying ship " Moresby " will recommission for further surveying service about April, 1935.

The destroyer " Tattoo," commissioned at Sydney on 8th January as tender to the " Cerberus," and left on the 10th to be placed in Class " C " Reserve at Western port.

H.M.A.S. " Anzac " has been removed from the active list of the R.A.N., and has been placed on the sale list.

ROYAL CANADIAN NAVY

ORGANIZATION.—It was notified officially on 22nd December that H.M. Canadian destroyers in commission are to be known collectively as " H.M.C. Destroyer Division." Those in commission on the East and West Coasts are to be known as the " East Coast Subdivision " and " West Coast Subdivision " respectively.

DIVISIONAL CRUISE.—In January the " Saguenay " and " Champlain " left Halifax, and the " Skeena " and " Vancouver " left Esquimalt to join forces at Kingston, Jamaica, on 4th February. They will work as a Division until 17th April, and will meet Home Fleet ships during the visit of the latter to West Indian ports.

NEW ZEALAND DIVISION, ROYAL NAVY

With the concurrence of H.M. Government in New Zealand, Captain the Hon. E. R. Drummond, M.V.O., R.N., has been selected to succeed Rear-Admiral F. Burges Watson, D.S.O., as First Naval Member of the New Zealand Naval Board, and as Commodore Commanding the New Zealand Station, being lent to H.M. Government in New Zealand as a Commodore, Second Class, to date 9th March, 1935.

The cruisers " Dunedin " and " Diomede " and the sloops " Leith " and " Laburnum " were present at Wellington on 15th December to welcome H.M.A.S. " Australia " on her arrival with the Duke of Gloucester on board. A salute of 21 guns was fired after the four ships had escorted the " Australia " to her berth.

ROYAL INDIAN NAVY

TITLE OF COMMANDING OFFICER.—In view of the conversion of the Royal Indian Marine into the Royal Indian Navy (see last quarter's JOURNAL), the title of Flag Officer Commanding and Director, Royal Indian Marine, Bombay, has been altered to Flag Officer Commanding, Royal Indian Navy, Bombay.

RETURN OF THE " HINDUSTAN."—The sloop " Hindustan," after visiting Melbourne to represent the R.I.N. at the Centenary, returned to Bombay on 24th January.

FOREIGN NAVIES

BRAZIL

NEW TRAINING SHIP.—The new training ship " Almirante Saldanha," constructed by Vickers-Armstrong, Ltd., for the Brazilian Navy, has arrived at Rio de Janiero.

CHINA

NEW CRUISER.—The small cruiser " Pinghai " is completing at Shanghai under the supervision of Japanese officers and foremen. It is reported that her machinery and armament are being supplied from Japan.

DENMARK

NEW CONSTRUCTION.—It is reported that three submarines are to be laid down during the current year. Of three new torpedo boats, the " Glenten " was com-

pleted in 1933; the "Hogen" is running trials; and the "Ornen" will complete in May, 1935.

The coast defence ship "Niels Juel" has been refitted and a new fire control system installed—mainly for instructional purposes.

ESTONIA

NEW SUBMARINES.—A contract for the construction of two submarines of 600 tons has been placed with Messrs. Vickers-Armstrongs.

FRANCE

NEW BATTLESHIPS.—The keel of the second battleship of the "Dunkerque" class, the "Strasbourg," was laid in the Penhoët Dockyard, at St. Nazaire, on 26th November, 1934, on the same slip from which the liner "Normandie" was launched. Details of the new ships are:—displacement, 26,500 tons; armament, eight 13-in., sixteen 5.2-in., and forty smaller guns; 100,000 horse-power; 29½ to 30 knots speed. Greater weight is being allotted to protection than in any other battleship type. It is expected that the ship will take about three years to complete.

BATTLESHIP MODERNIZATION.—The battleship "Provence" has now been modernized, and has joined the Second Squadron at Brest.

NEW FLOTILLA LEADERS.—The new flotilla leaders "Mogador" and "Volta," laid down at Lorient and Nantes respectively, will be heavier and faster than any of the 30 post-War flotilla leaders. Their displacement has been increased from the 2,569 tons of "Le Fantasque" to 2,930 tons; and horse-power from 74,000 to 90,000.

NAVAL AIR SERVICE

Under a new organization announced in the *Journal Officiel* last autumn, questions relating to the material and administration of the naval air service are co-ordinated in a *Service de l'Aéronautique Maritime*. The chief of this Service will be a flag or senior naval officer. He will be responsible to the Chief of the Naval Staff and have the prerogatives, technical and administrative, of a chief of the Central Administration, and the naval prerogatives of a Deputy Chief of the Naval Staff.

This officer's position and responsibilities would appear to be similar to those of our Fifth Sea Lord before the Royal Naval Air Service was merged in the Royal Air Force.

GERMANY

NEW BATTLESHIP.—The keel of a fifth battleship of the post-War series, the "Ersatz-Hannover," was laid down late last year in addition to that of the fourth battleship, the "Ersatz-Elsass."

It has been reported, but not confirmed, that these battleships will be of heavier tonnage and armament than the "Deutschland" and "Admiral Scheer."

The "Admiral Scheer" was commissioned on 12th November, 1934.

NEW CRUISER.—The cruiser "Nürnberg" was launched on 8th December from Kiel Dockyard. The occasion was the twentieth anniversary of the battle of the Falklands, and Frau von Schoenberg, widow of Captain von Schoenberg, who lost his life in the action, performed the naming ceremony.

The "Nürnberg" is the sixth of the German post-War cruisers. The Versailles Treaty allowed Germany six cruisers in commission and two in reserve, with the

right to replace vessels over twenty years old. In addition to the " Nürnberg," therefore, two more cruisers could be built to replace the over-age ships " Berlin " and " Hamburg."

JAPAN

SECOND REPLACEMENT PROGRAMME.—It was announced from the Navy Department at Tokyo on 14th December that the construction had been begun of all the vessels in the 1934 section of the Second Naval Replacement programme. They include the 10,000-ton aircraft carrier " Soryu " (Blue Sky Dragon) ; a seaplane carrier ; four submarines ; a torpedo boat ; and a 10,000-ton oil tanker.

FIRST REPLACEMENT PROGRAMME.—The cruiser " Suzuya," which was launched at the naval dockyard at Yokosuka on 20th November in the presence of the Emperor, is the third of the four ships of the " Mogami " class, authorized in 1931. They are of 8,500 tons, 90,000 horse-power, 33 knots speed, and armed with fifteen 6.1-in. guns, eight 5-in. anti-aircraft guns, and twelve torpedo tubes.

Of the twelve destroyers of 1,368 to 1,378 tons belonging to this Programme, four are complete, two have been launched, four have been laid down, and two were still due to be laid down at the end of last year.

One submarine of 1,970 tons, " I.6," has been launched ; of six submarines of 1,400 tons, one is completed, three have been launched, and two laid down. One small " R " class submarine has been launched, and one laid down.

The 4,400 ton minelayer " Okinoshima " has been laid down.

The four torpedo boats of the " Chidori " class and the submarine depot ship " Taigei " are completed.

Of the fourteen new air squadrons, probably at least 50 per cent. are completed.

PORTUGAL

NEW DESTROYER.—The destroyer " Dao " was handed over on 5th January at Lisbon, where the vessel had been built under the supervision of Messrs. Yarrow and Co., Ltd. The " Dao " is the third of a class of five destroyers of 1,383 tons, 36 knots, armed with four 4.7-in., three pom-poms, two depth-charge throwers, and eight 21-in. torpedo tubes. Two similar vessels, the " Vouga " and " Lima," were completed in 1933 by Messrs. Yarrow on the Clyde. Two others, the " Douro " and " Tejo," were sold in 1934 to Colombia, and replacement vessels for them have been ordered. At 15 knots the radius of action is 5,400 miles.

SUBMARINE TRIALS.—The submarine " Delfim," built by Vickers-Armstrong, Ltd., carried out diving trials off Plymouth and torpedo trials off Portland in December

SOVIET UNION

SUBMARINES AT VLADIVOSTOK.—Early in November it was reported in Tokyo by a " well-informed traveller just returned from Vladivostok " that a flotilla of fifty up-to-date Soviet submarines was lying in the harbour there. It was stated that many parts were taken by railway and assembled at Vladivostok. In official circles at Tokyo, added the report, the presence of these vessels, together with a substantial number of aeroplanes, was regarded as a real menace to Japanese communications with the mainland.

UNITED STATES

ANNUAL REPORT.—In his Annual Report, dated 1st December, 1934, Mr. Swanson, Secretary for the Navy, says that the most important event during the year was the passage by Congress, and the approval by the President, of the law establishing the strength of the Navy and authorizing the construction of vessels and aircraft to bring the Navy up to prescribed Treaty strength and to replace ships as they pass the age-limit. This involves work on 70 ships at present. When this construction is completed within the next thirty months the United States Navy will still be short by 78 ships of the full treaty strength.

Dealing with inadequate personnel, the Secretary states that 85 per cent. of complement of the larger combatant ships is the minimum below which it is not safe to go, and that still larger percentages are required for the small ships and auxiliaries. This would require for the approved operating plan for the fiscal year of 1935 a total of 86,615 enlisted men, but appropriations for the year will permit the maintenance of an average of only 81,500 men. "It is certain," adds the Secretary, "that there must be a very considerable increase in the authorized number of line officers in the Navy. A thorough study shows that at least 7,000 line officers will be necessary to man the Treaty Navy, and it is the present intent of the Department to request an increase to that number."

NEW CONSTRUCTION.—A further programme of new construction for the fixed year July, 1935–June, 1936, has been approved in principle, and the Bureaux are preparing budgetary estimates for:—one aircraft carrier of 14,500 tons to replace the "Langley"; two 6-inch gun cruisers to replace the "Milwaukee" and "Omaha"; three flotilla leaders of 1,850 tons; twelve destroyers of 1,500 tons; and the submarines.

It is also proposed to lay down twelve destroyers, and six submarines in each of the years 1936–7, 1937–8, 1938–9.

All these programmes will require the approval of estimates by Congress and the President before action can be taken

NEW CRUISERS' NAMES.—The heavy cruiser, C.A.45, of the 1934 Programme, is to be named the "Wichita"; the three light cruisers, C.L. 46, 47, 48, will be named the "Phœnix," "Boise," and "Honolulu."

NEW SUBMARINES' NAMES.—The six submarines building under the 1934 programme have been named as follows:—three by the Electric Boat Co., Groton, Conn., the "Plunger," "Pinna," and "Pollack"; two by the Portsmouth Navy Yard, the "Perch" and "Pickerel"; and one by the Mare Island Navy Yard, the "Pompano." These vessels were the first under the Vinson Act to be given names.

COMMANDER-IN-CHIEF, U.S. FLEET.—The period of command of Admiral Joseph M. Reeves has been extended for another year.

NAVAL AIR SERVICE

NEW PROGRAMME.—The proposed construction programme for 1935–36 is 500 aircraft—half for replacements, and half for "expansion," including the complements of the new carriers "Yorktown" and "Enterprise."

NEW AIRSHIP.—The "Akron" is not to be replaced, but the Navy Department have recommended the construction of a small dirigible of approximately 2,500,000 cubic feet—about one-third the size of the "Macon."

ARMY NOTES

HOME

H.R H. The Prince of Wales.

Lieutenant-General H.R.H. The Prince of Wales, K.G., K.T., K.P., G.C.S.I., G.C.M.G., G.C.I.E., G.C.V.O., G.B.E., M.C., Personal A.D.C. to the King, has been promoted General.

Appointments and Promotions.

H.M. the King has approved of the following appointments:—

Colonel O. F. Perkins, D.S.O., to be Aide-de-Camp to the King, in succession to Colonel J. L. Buxton, C.M.G., D.S.O., retired; Colonel (temporary Brigadier) C. C. Foss, V.C., D.S.O., to be Aide-de-Camp to the King in succession to Colonel (temporary Brigadier) V. M. Fortune, D.S.O., promoted.

General Sir Archibald A. Montgomery-Massingberd, G.C.B., K.C.M.G., LL.D., Colonel Commandant, Royal Artillery, Aide-de-Camp General to the King, Chief of the Imperial General Staff, to be Colonel Commandant, Royal Tank Corps, in succession to Major-General Sir John E. Capper, K.C.B., K.C.V.O.

In consequence of the establishment of Colonels Commandant, Royal Tank Corps, being increased by two, Lieutenant-General Sir Hugh J. Elles, K.C.M.G., K.C.V.O., C.B., D.S.O., Master-General of the Ordnance, and Colonel (honorary Major-General) Sir Ernest D. Swinton, K.B.E., C.B., D.S.O., have been appointed to these vacancies.

Colonel (honorary Brigadier) H. C. Smith, D.S.O., to be Colonel Commandant, Royal Corps of Signals, in succession to Lieutenant-General Sir John S. Fowler, K.C.B., K.C.M.G., D.S.O.

In consequence of the establishment of Colonels Commandant, Royal Corps of Signals, being increased by one, Colonel (temporary Brigadier) R. H. Willan, D.S.O., M.C., Aide-de-Camp to the King, has been appointed to that vacancy.

Major-General J. E. S. Brind, C.B., C.M.G., D.S.O., was appointed to the command of the British troops and of the International Force which was sent to the Territory of the Saar during the recent plébiscite.

Lieut.-General Sir Ivo L. B. Vesey, K.B.E., C.B., C.M.G., D.S.O., to be General Officer Commanding-in-Chief, Western Command, India, in succession to General Sir Torquhil G. Matheson, K.C.B., C.M.G., to take effect from June, 1935.

Major-General C. G. Liddell, C.B., C.M.G., D.S.O., to be Commander, 47th (2nd London) Division, Territorial Army, in succession to Major-General R. D. F. Oldman, C.B., C.M.G., D.S.O.

Major-General W. D. S. Brownrigg, D.S.O., to be Commander, 51st (Highland) Division, Territorial Army, with effect from 16th June, 1935, in succession to Major-General Sir James L. G. Burnett of Leys, Bt., C.B., C.M.G., D.S.O.

Major-General H. F. Salt, C.B., C.M.G., D.S.O., to be D.A.G. (Director of Organization) at Army Headquarters, India, in succession to Major-General G. Thorpe, C.B., C.M.G., D.S.O., appointed Commander, 53rd (Welsh) Division, Territorial Army.

The following have been promoted :—

Colonel T. E. Dalby, D.S.O. ; Colonel (temporary Brigadier) V. M. Fortune, D.S.O. ; Colonel R. H. Darwall, C.B.E., D.S.O. (Royal Marines), to be Major-Generals.

Organization and Nomenclature.

Royal Artillery, 9th Heavy Brigade.—H.M. the King has approved the formation of the 9th Heavy Brigade, Royal Artillery, for service in Malaya, with effect from 1st November, 1934, to consist of Headquarters, the 7th Heavy Battery, Royal Artillery, and the 22nd Heavy Battery, Royal Artillery.

Hong Kong–Singapore Royal Artillery.—H.M. the King has approved—

That the Hong Kong–Singapore Brigade, Royal Artillery, be re-designated Hong Kong–Singapore Royal Artillery.

That the existing 4th and 5th Heavy Batteries, Hong Kong–Singapore Brigade, Royal Artillery, be re-designated 3rd and 4th Heavy Batteries, Hong Kong–Singapore Royal Artillery, respectively.

That the portion at Hong Kong be designated Hong Kong Brigade, Hong Kong–Singapore Royal Artillery, to consist of :—

Headquarters, Hong Kong Brigade, Hong Kong–Singapore Royal Artillery.

1st Mountain Battery, Hong Kong–Singapore Royal Artillery.

2nd Heavy Battery, Hong Kong–Singapore Royal Artillery.

3rd Heavy Battery, Hong Kong–Singapore Royal Artillery.

4th Heavy Battery, Hong Kong–Singapore Royal Artillery.

That the existing 3rd Heavy Battery, Hong Kong–Singapore Brigade, Royal Artillery, be re-designated 5th (Singapore) Heavy Battery, Hong Kong–Singapore Royal Artillery, and be brigaded in the existing 7th Heavy Brigade, Royal Artillery.

The Black Watch.—H.M. the King has approved of the designation of The Black Watch (Royal Highlanders) being changed to " The Black Watch (Royal Highland Regiment)."

Mechanization in the Cavalry.

With a view to finding a mechanized substitute for horsed cavalry, it is intended during 1935 to conduct experiments in the 2nd Cavalry Brigade at Tidworth with a mechanized cavalry regiment, which is to be organized into headquarters, a headquarter squadron containing the following troops :—(*a*) headquarter troop (including signals) ; (*b*) administrative troop ; (*c*) scout troop ; (*d*) mortar troop ; and three squadrons each of three troops of three sections each equipped with a light machine gun. In the squadrons each section will have a vehicle and the scout troop will be given light cars each carrying two men. The vehicles used will have armoured protection for the engine and the driver.

During the forthcoming training season the 3rd Hussars will conduct trials to test the suitability of the organization, equipment and motor vehicles by mechan-

izing one squadron and the scout troop which forms part of the headquarter squadron.

The New Uniform.

Trials have been going on during the past two training seasons to find suitable clothing and equipment for soldiers doing field training and on active service. Two battalions, 2nd Bn. Queen's Royal Regiment, and 1st Bn. Durham Light Infantry, have been carrying out these experiments. On 28th November, 1933, Mr. Duff Cooper replied to a question in the House of Commons, that the special question being considered was the suitability of the new uniform to wet weather, of which, at the time, we had not had very much.

The War Office announces that no decision has been reached as trials have only just been concluded.

The present uniform has been condemned for hygienic reasons and because it hampers movement; now it is feared that the trial uniform will adversely affect recruiting.

NOTICE.

Gill Memorial Scholarships and Exhibitions at Brighton College for Sons of Army Officers.

It is announced that one or two Gill Memorial Scholarships, together with two Exhibitions at Brighton College, are offered in 1935 for competition among sons of Army Officers.

Candidates will take the ordinary June Common Entrance Examination at their own preparatory schools. Admission to compete for the Scholarships and Exhibitions is by nomination, and candidates must be :—

(1) Under the age of 14 years on 1st June, 1935, and
(2) The sons of officers who hold or have held His Majesty's Commission in the Regular Army, or, failing such candidates, the sons of officers who hold or have held His Majesty's Commission in the Reserve or Auxiliary Military Forces.

The annual value of a Gill Memorial Scholarship is £75, and of an Exhibition £50, thus reducing the amount payable by a parent or guardian to approximately £75 and £100 respectively, inclusive of necessary extras. Scholarships and Exhibitions are tenable for three years, but the period may, on the recommendation of the Headmaster, be extended to four years.

Applications for nomination by the War Office (accompanied by Birth Certificate and Certificates of Conduct covering the previous two years) should reach the Under-Secretary of State (C.1), The War Office, London, S.W.1, not later than 30th April, 1935.

THE TERRITORIAL ARMY

Staff College Conference.

A Conference has been held at the Staff College, at which problems of importance to the organization and administration of the Territorial Army were discussed. The Chief of the Imperial General Staff presided, and, in addition to other members of the Army Council and military and civilian members of the War Office staff, serving officers of the Territorial Army and members of Territorial Army County Associations from different parts of the country, and General Officers Commanding-in-Chief and Territorial Army Divisional Commanders attended. Among the subjects ventilated were the co-operation of the Regular and Territorial armies in the discharge of their respective responsibilities in the matter of national defence and the

measures to be taken to organize the air defence of Great Britain in the light of modern necessities.

The valuable contributions made, during the full and free discussions that ensued, by the officers of the Territorial Army and members of the Territorial Army County Associations towards the solution of the various questions under review will receive the early consideration of the Army Council, who hope that decisions will be reached in time for an announcement of their policy to be made by the Financial Secretary of the War Office in introducing the Army Estimates in the House of Commons.

After the Conference the following letters was circulated to the Press :—

10th January, 1935.

STAFF COLLEGE CONFERENCE.

SIR,

With reference to the official *communiqué* from the War Office on the above, published in your columns, may we, the various representatives of the Territorial Army, both members of County Associations and serving officers, who have just left the Conference at the Staff College, amplify the necessarily brief summary issued by the War Office by assuring you, sir, your readers and those who have already taken up their pen to ventilate their views, or are about to do so, that the Army Council have shown the utmost readiness to hear our opinions, and give every sympathy to the special circumstances of the Territorial Army.

It is a travesty of the facts to say that there is any lack of readiness whatever on the part of the War Office to take the Territorial Army into full consultation. We have had every opportunity of expressing ourselves from every point of view, not only on wide questions of general policy, but on the local difficulties of our respective counties. We do therefore appeal to all those who have the welfare of the Territorial Army at heart to refrain from comment and criticism, which cannot be helpful and might actually be detrimental, until the full proposals are made public.

Yours faithfully,

(*Signed*)

E. M. BROOKE TAYLOR, Lieut.-Colonel.	Derbyshire.
JOHN BROWN, Colonel.	Northampton.
G. T. BRUCE, Colonel.	Glamorgan.
B. A. CAMPBELL, Colonel.	Argyll.
WILLIAM COATES, Colonel.	East Lancashire.
COBHAM, Colonel.	Worcestershire.
F. G. DANIELSEN, Colonel.	Warwickshire.
A. P. DRAYSON, Colonel.	Surrey.
F. H. HANCOCK, Lieut.-Colonel.	Kent.
E. J. KING, Colonel.	Middlesex.
E. T. LE MARCHANT, Brig.-General.	Nottinghamshire.
J. J. LLEWELLYN, Lieut.-Colonel.	Dorset.
G. GARDNER MCLEAN, Lieut.-Colonel.	City of Glasgow.
SCARBROUGH, Major-General.	West Riding (Yorkshire).
P. R. SIMNER, Colonel.	County of London.
P. J. SLATER, Lieut.-Colonel.	Staffordshire.
G. H. STOBART, Colonel.	Durham.
FRANCIS H. D. C. WHITMORE, Colonel.	Essex.
EVELYN WOOD, Colonel.	City of London.

NOTICE

The University of London Course for the Academic Diploma in Military Studies.

In the Journal for August, 1933, attention was drawn to the course of lectures and instruction in military subjects which the University of London provides for officers of the Territorial Army and of the Officers Training Corps.

The steadily increasing importance now being given to the role and responsibilities of the Territorial Army, in regard both to Home Defence and also to its forming the sole basis of expansion of our military strength in case of national emergency, was emphasised during the recent Conference at the Staff College. The military education of the officers of the Territorial Army and of the Officers' Training Corps, combined with their ability to undertake efficiently the duties of imparting instruction within their units, must correspondingly increase in importance.

The Course in Military Studies held by the University of London, which the War Office recognizes and assists greatly in providing lecturers on expert subjects, and also in granting permission for the students to visit Schools of Instruction, demonstrations, etc., provides a thorough military education which should be of considerable value to both the Territorial Army and the Officers' Training Corps.

The Course also includes a visit to the battlefields of the Great War in France.

Lectures, etc., take place on two evenings in the week at the centrally situated King's College, Strand, and the total fees for the whole Course of two years amount to under £25.

The next Course will commence in October next, but application to join should be made by July if possible.

Full details can be obtained on application to :—

The Academic Registrar,
University of London,
South Kensington, S.W.7.

DOMINION FORCES

Regimental Alliances.—H.M. the King has approved the following regimental alliances :—

4th Light Horse Regiment (Corangamite Light Horse), Australian Military Forces, to the 4th/7th Dragoon Guards.

10th Light Horse Regiment (Western Australia Mounted Infantry), Australian Military Forces, to the 10th Hussars.

45th Battalion, Australian Military Forces, to The Welch Regiment.

The Hastings and Prince Edward Regiment of the Non-Permanent Active Militia of Canada to The Royal Sussex Regiment.

INDIAN ARMY

Major-General H. J. Huddleston, C.B., C.M.G., D.S.O., M.C., has assumed command of the Residency of Assam District.

Major-General O. H. L. Nicholson, C.B., C.M.G., D.S.O., has assumed command of the Deccan District.

INDIAN ARMY RESERVE OF OFFICERS.—The Army in India Reserve of Officers is to be reorganized as an Indian Army Reserve of Officers only. Under the present system the Army in India Reserve of Officers constitutes the reserve not merely for the Indian Army but for units of the British Army in India.

In future there will be three classes. One for the younger officers, which will be for fighting units only, and from which officers, on reaching a fixed age, will go to the second class. The second for older officers for administrative services. The retaining fee for these two classes will be 200 and 100 rupees respectively. The third class will be for those who register their names voluntarily without fee for service in emergency.

FOREIGN

ITALY

REORGANIZATION OF THE ITALIAN ARMY.—The reorganization of the Italian Army, which has been in progress for some years, is nearing finality. The main features of this process have been :—

(1) The reduction of the number of infantry battalions comprised in the infantry division, and the re-allotment of the new divisions.
(2) The rearmament of the infantry.
(3) The creation of two mobile divisions consisting of fast-moving troops.
(4) The reorganization of the Fascist Militia and of its battalions allotted to the Regular Army.

(1) The infantry division is henceforth to comprise three regiments of three battalions apiece. This step renders the division a small handy formation which is to be regarded as a distinct entity, not to be broken up. To encourage the feeling of divisional solidarity, each division, in addition to its number, is receiving a historic or topographic title which is to be further strengthened by the adoption of a divisional badge.

There are to be 30 such divisions. These, it is believed, will be organized into 11 army corps ; the latter would, on mobilization, most probably be grouped into 4 armies. Two of these are clearly intended to be capable of instant mobilization in Northern Italy, to the North of the Apennines, where they would be active in war ; a third army, coming from Central Italy, should be able to reinforce these two within a short period of time. For such a purpose the new tunnel lately pierced through the Apennines between Florence and Bologna possesses considerable strategic value, since the previously existing line, owing to steep gradients and curves, would have been totally inadequate to cope with heavy military movements. The fourth army, raised in Southern Italy, Sicily and Sardinia, would find employment as circumstances dictate.

The Italian Army, being primarily designed to be engaged in warfare in the zone of the Alps, is better served by this more pliable organization. It must also be remembered that its most probable movements in the Alpine foothills would be covered by the mountain troops (*Alpini*), which are among the very best units Italy can put into the field. The Alpini consist of 27 battalions and 27 batteries.

The Italians are not so well off as to artillery. At present they possess but 48 field guns per division. These, however, are supported by one or two motorized groups of field artillery, and by one regiment of 48 heavy guns (4-inch guns and 6-inch howitzers) per army corps; there is also an army reserve of 10 heavy artillery regiments which is to be reorganized.

(2) In view of its weakness in field artillery, the division will gain much in fire power from the rearmament of the infantry. In the new scheme each infantry regiment will receive a battery of 4 65-mm. (2.7-inch) guns; an essential of this new weapon is that it will be " simple and practical, independent of any complicated instruments of precision "; each battalion receives some " light but very effective " 63-mm. (2.5-inch) mortars, each company some smaller mortars of 38 mm. (1½-inch) or 50-mm. (2-inch) calibre. The details of this equipment have not yet been finally settled. It is worth noting that the infantry battery is to work with the divisional artillery in preparing an attack, and then to advance with the battalion in that attack.

(3) In addition to cavalry, the fast-moving troops of the Italian army consist of 12 regiments of *Bersaglieri*, i.e., cyclist rifles; 2 regiments of tanks, one which is equipped with light Fiat machines, the other with fast small machines equivalent to the Carden Loyd. The total number of tanks is about 150–200.

These fast-moving troops have been reserved mainly for the constitution of two " mobile " divisions, which will be discussed below. But " fast " detachments from them are attached to each army corps headquarters.

(4) A great feature of the reorganization has been the part allotted to the Fascist Militia.

The pre-military training of boys is now carried out entirely by the Fascist Militia, who supply personnel and organize all the exercises carried out by it. A new inspectorate under General Grazioli is to superintend the whole work.

The training of boys now begins in the *Balilla*, which the children enter at the age of 8 years, and where they remain up to 14 years. No serious training is attempted at this stage, the idea being to instil into the youngsters ideas of discipline and of the " team spirit " by means of games and exercises. At the age of 14 the boys enter the ranks of the *Avanguardisti*, where the training assumes a distinctly military nature. The boys are now subjected to various tests by means of which it is intended to discover those who possess any bent for command. A camp for such lads, selected all over Italy, was held at Rome in 1934; this was attended by 5,000 lads all between 15 and 17 years of age. The training at this school was directed towards teaching the duties of non-commissioned officers. There are some 500,000 *Avanguarditi*.

From 18 years of age upward the lads are trained in the *Fasci Giovanili di Combattimento* (the Fighting Youth organization). Here they receive a strictly pre-military training up to the age of 21. By the law of December, 1930, all Italian youths, whether they are Fascists or not, have to pass through this organization. The boys desiring to enter the special services of the army, the navy or the air force receive suitable courses of instruction. The training is imparted during 40 parades annually, each parade lasting three hours. Throughout Italy during the year 1932–33 over 872,000 youths were thus trained by some 27,500 instructors.

The Fascist Militia is also entrusted with the training of the University cadets; there are 30 such corps.

The young men on reaching 21 years of age enter the ranks of the army or other arms. In the army they serve about 3 to 4 years.

On entering the reserve at the end of his service the trained man receives further instruction as a reservist in the ranks of the Fascist Militia, whether he belongs to the Fascist Party or not. The army does not give him any further training unless he is required for embodiment for manœuvres, active service or special duty. This reserve service lasts until the age of 55.

But a remarkable part of the Fascist Militia's duties is the supply of picked battalions and machine-gun companies for service with the active army. In August, 1934, it was decreed that four or five Fascist battalions (*Camicie Nere* = C.NN.), with one machine-gun company, should be allotted to each army corps. Each " mobile " division is to receive two such battalions, with one machine-gun company.[1] These troops are to be regarded as a *corps d'élite* and to be used by the general commanding an army corps, or mobile division, as a decisive reserve or for the execution of some special task needing special physical and mental aptitude. In 1934 there were 36 Fascist Militia battalions training with the regular army.

The remainder of the Fascist Militia plays a most important part in the anti-aircraft defence of Italy. It is now under consideration to call upon the Militia to man the entire coast defences of the country.

It will be seen that General Teruzzi, the Chief of Staff of the Fascist Militia, was fully justified in claiming that " the spiritual and technical fusion of the Militia and the Army will now be complete."

The New " Fast " Division.—Two light, mobile, " fast " divisions have now been formed in Italy, and were tested at the recent military manœuvres.

This division consists of two wings, the one horsed, the other mechanized. In the former are grouped cavalry, horse artillery and cyclists; in the latter are tanks, motor-cyclists, motorized artillery and infantry. The composition is not yet finally fixed, but should consist of :—

2–3 cavalry regiments;
2–3 Bersaglieri (cyclist) regiments;
a few motor-cyclist companies;
1 horsed or motorized artillery regiment;
several tank companies;
2 Fascist Militia battalions, one on cycles, the other transported in lorries, with one machine-gun company.

In addition there will be a normal proportion of signal, pioneer and supply units.

FRANCE

A Mechanized Division.—In France various suggestions have been put forward for an improved mechanized division. Chief among these is a plan that has been widely commented upon in the French and German technical press. The main components of the proposed division would roughly be :—

[1] In this case one battalion is a cyclist battalion; the other is carried on motor lorries.

Headquarters : Comprising a section of light tanks, a section of light armoured cars, a section of motor-cyclists, and a flight of 12 aeroplanes ;
1 regiment of tanks ;
1 regiment of " transported " infantry ;
1 regiment of artillery (towed) ;
1 group of anti-aircraft artillery ;
1 reconnaissance detachment ;
1 battalion (wholly mechanized) of pioneers.

Notes.—(1) The tanks are to be divided into two battalions, one light, the second heavy. The armament of the heavy tank is to consist of machine-guns, of which one is to be 1.2-inch calibre, and 3-pdr. guns. The heavy tank is virtually the backbone of the division.

(2) The infantry regiment is to be of three battalions, one of which is to be carried on cross-country six-wheelers, the remaining two on normal fast lorries. It is expected that, should it be feasible, these lorries would in time be replaced by six-wheelers.

(3) A regiment of artillery of four groups represents a very high proportion of guns : at least one group should be armed with 105-mm. (4-inch) guns, which can be employed for high-angle fire, and thus be employed to silence hostile anti-tank guns.

Such a strength in artillery means that this mechanized division should be able to cope with an infantry division of present-day type. It is also necessary because the French do not contemplate using any tanks for, strictly speaking, artillery purposes. The guns would probably be transported on trailers.

(4) The reconnaissance section would be equipped with light armoured cars, equipped only with light machine guns. The lack of armour to resist armour-piercing bullets is a drawback, but is probably to be accounted for by the fact that normal motor-car chassis are contemplated for use in this connection. But these armoured cars are to be supported by two sections of motor-cyclists ; each section of these is to be equipped with one platoon of heavy machine guns.

(5) An aviation unit is becoming essential to any large mechanized formation ; the latter, indeed, could not be regarded as safe without means for instant air reconnaissance. The flight is to consist of 12 machines.

(6) Anti-aircraft artillery is becoming more and more an essential part of a mechanized division, since such a formation must infallibly become a favourite target for hostile aviators. Moreover, the presence of a mechanized division will usually indicate an important focus of battle. Anti-aircraft guns will need to be mounted on mechanical chassis. The proposal is to allot only two batteries of A.A. guns to such a division : this appears to be very little, although it has to be remembered that the " transported " infantry battalion and the tanks should be able to turn their own armament to anti-aircraft uses.

(7) Anti-tank armament is supplied to the infantry and artillery regiments, one company to each. An additional anti-tank company is allotted to the aviators : this may seem meaningless, but is, in fact, a wise proposal, seeing that the aircraft may often be employing a flying base situated at some distance from the division.

In addition there should be for ancillary purposes :—

2 mobile tank headquarters ;
1 signal company ;

1 field ambulance;
2 petrol supply columns;
2 mobile workshops;
4 supply columns (each of a capacity of 60 tons).

The supply of infantry ammunition will be carried out by means of armoured carriers, which might be employed—after unloading—by battalion commanders as needed.

There is not a single horse in this proposed formation. A feature of the division is the use of motor-cyclists; each infantry battalion has one company; the pioneer battalion, divisional headquarters, and the artillery regiment are each to have one section. Recent experience has shown that these motor-cyclists possess a mobility fully equal to that of the six-wheeler.

The next step will be to incorporate such a division in a cavalry corps, and in that case to work out the corps troops, whereby the mixed corps of armoured and unarmoured troops may be kept in touch and enabled to work together.

AIR NOTES

ROYAL AIR FORCE

H.R.H. THE PRINCE OF WALES.

H.R.H. The Prince of Wales, K.G., K.T., K.P., G.C.S.I., G.C.M.G., G.C.I.E., G.C.V.O., G.B.E., M.C., Personal A.D.C. to the King, was promoted to Air Chief Marshal, to date 1st January, 1935.

THE AIR COUNCIL.

In view of the largely increased volume of work falling on the Air Ministry as a result of the recent decision to effect an early expansion of the Royal Air Force, the Secretary of State for Air has decided to appoint an additional Member to the Air Council.

The Air Council will in future, like the Board of Admiralty and the Army Council, comprise four Service Members. The new Air Member will be responsible for the administration of the Directorates of Organization, Equipment, and Works and Buildings.

Air Vice-Marshal C. L. N. Newall, C.B., C.M.G., C.B.E., A.M., has been selected to fill this new appointment, which he took up with effect from 14th January, 1935.

HONOURS AND AWARDS.

The following were published in the *London Gazette* dated 1st January, 1935 (New Year Honours) :—

K.C.B. (*Mil.*).—Air Marshal Sir John Miles Steel, K.B.E., C.B., C.M.G.

C.B. (*Mil.*).—Air Vice-Marshal W. G. S. Mitchell, C.B.E., D.S.O., M.C., A.F.C., and Air Commodore C. E. H. Rathborne, D.S.O.

M.B.E. (*Mil.*).—Flight Lieutenant A. A. Poole, R.A.A.F.

Air Force Cross.—Squadron Leader V. S. Parker, D.F.C.; Flying Officer G. N. Snarey; Squadron Leader the Marquess of Douglas and Clydesdale, M.P. (Auxiliary Air Force).

OPERATIONS ON NORTH-WEST FRONTIER, 1933.—H.M. the King has been graciously pleased to command that the India General Service Medal with clasp "Mohmand 1933" shall be granted, provided the claims are approved by the Air Council, to the personnel of the Royal Air Force who took part in the operations against the Upper Mohmands on the North-West Frontier of India, 1933.

The medal and clasp will be granted to (i) officers and airmen of, or attached to, No. 20 (Army Co-operation) Squadron during the period 28th July, 1933, to 3rd October, 1933, both dates inclusive, and (ii) certain personnel of No. 1 (Indian) Group Headquarters, Peshawar, who served in the area West of the road Abazai–Shabkadar Fort–Shabkadar–Pir Kala–Michni, between the Swat and Kabul rivers, inclusive of the above-mentioned places, during the same period.

Individuals previously awarded the medal will receive the clasp only.

The grant of the medal or clasp will not be made in respect of visits to the sphere of operations, or of service of a temporary nature.

Promotions.

The undermentioned promotions were made with effect from 1st January, 1935 :—

Air Marshal to be Air Chief Marshal.—Sir Robert Brooke-Popham, K.C.B., C.M.G., D.S.O., A.F.C., A.D.C.

Air Vice-Marshal to be Air Marshal.—A. M. Longmore, C.B., D.S.O.

Air Commodores to be Air Vice-Marshals.—C. L. Courtney, C.B., C.B.E., D.S.O. ; C. T. Maclean, C.B., D.S.O., M.C.

Group Captains to be Air Commodores.—S. W. Smith, O.B.E. ; C. F. A. Portal, D.S.O., M.C.

Wing Commanders to be Group Captains.—R. G. Parry, D.S.O. ; C. C. Darley, C.B.E., A.M. ; G. B. Dacre, D.S.O. ; M. Henderson, D.S.O. ; L. L. Maclean ; K. R. Park, M.C., D.F.C.

Appointments.

The following appointments take effect as from the dates shown :—

Air Marshal.—Sir Edgar R. Ludlow-Hewitt, K.C.B., C.M.G., D.S.O., M.C., now Director of Operations and Intelligence and Deputy Chief of the Air Staff, to be Air Officer Commanding, R.A.F., India, in March, 1935, *vice* Air Marshal Sir John M. Steel, K.B.E., C.B., C.M.G.

Air Vice-Marshal.—C. L. Courtney, C.B., C.B.E., D.S.O., from Director of Staff Duties, to be Director of Operations and Intelligence and Deputy Chief of the Air Staff, to date 26th January, 1935.

Air Commodores.—A. D. Cunningham, C.B.E., to Headquarters, Air Defence of Great Britain, as Senior Air Staff Officer, to date 20th November, 1934 ; B. E. Sutton, D.S.O., O.B.E., M.C., to Headquarters, R.A.F., India, as Senior Air Staff Officer, to date 4th October, 1934 ; A. S. Barratt, C.M.G., M.C., to be Director of Staff Duties, to date 12th January, 1935.

Group Captain.—J. S. T. Bradley, O.B.E., to be Director of Equipment, to date 14th January, 1935, *vice* Air Commodore A. W. Bigsworth, C.M.G., D.S.O., A.F.C.

Organization.

The move of No. 99 (B) Squadron from Upper Heyford to Mildenhall was completed by 14th November, 1934.

The move of No. 33 (B) Squadron from Bicester to Upper Heyford was completed by 27th November, 1934.

No. 1 Armament Training Camp, Catfoss, closed temporarily with effect from 22nd October, 1934, and No. 3 Armament Training Camp, Sutton Bridge, closed temporarily with effect from 12th November, 1934.

The move of No. 101 (B) Squadron from Andover to Bicester was completed on 1st December, 1934.

No. 230 (F.B.) Squadron commenced to form at Pembroke Dock on 1st December, 1934, and comes under the command of A.O.C., Coastal Area.

No. 142 (B) Squadron has moved from Netheravon to Andover and is now under the command of A.O.C., Western Area.

With effect from 1st January, 1935, " D " and " E " Flights, stationed at the R.A.F. Base, Gosport were re-named " A " (Torpedo Training) Flight and " B " (Torpedo Experimental) Flight, respectively.

The existing " C " Flight is now named " C " (Deck-landing Training and Flying Practice) Flight.

" SINGAPORE " FLYING BOATS FOR FAR EAST.—Four Short " Singapore " flying boats, flown by personnel of No. 210 (F.B.) Squadron, under the command of Squadron Leader A. F. Lang, M.B.E., left Pembroke Dock for Singapore on the 15th January, 1935, and on arrival will replace the existing equipment of Supermarine " Southamptons " of No. 205 (F.B.) Squadron.

As a preliminary to this flight of over 8,000 miles, a cruise round England and Scotland was carried out by the " Singapores " early in December, 1934.

PERSONNEL.

R.A.F. COLLEGE—AWARD OF KING'S MEDAL.—H.M. the King has been graciously pleased to signify his intention of awarding a prize each half-year to the Flight Cadet at the R.A.F. College, Cranwell, who, in the final order of merit following the passing-out examination, obtains the highest aggregate marks in all subjects.

The prize, which will be in the form of a medal—to be known as " The King's Medal "—will be first awarded in July, 1935, on the results of the passing-out examination at the end of the spring term.

PASSING-OUT INSPECTION.—The Passing-Out Inspection of Flight Cadets from the R.A.F. College was carried out by Air Chief Marshal Sir Edward L. Ellington, K.C.B., C.M.G., C.B.E., Chief of the Air Staff, on 14th December, 1934.

The Sword of Honour, presented to the best all-round Flight Cadet in the senior term, was awarded to Flight Cadet Under-Officer H. M. Styles.

R.A.F. RESERVE.—In the light of present requirements, measures have recently been taken to broaden the basis of the reserve of pilots, with particular reference to the entry and training in flying duties of candidates from civil life.

Direct entrants into the Reserve from civil life, with the exception of candidates who hold a certificate of proficiency granted in a University air squadron, are entered as airman pilots. There are two sections to the class (known as class F.) in which these entrants are placed. Section I comprises pilots who hold a Class A. civil pilot's licence and have completed not less than 25 hours' flying. Section II comprises pilots who have had no previous flying experience (or insufficient experience to qualify them for inclusion in Section I), and who are trained *ab initio* in the Reserve.

Candidates must have attained the age of 18, but must not have attained the age of 28 for Section I, or 25 for Section II. They must have had a good education and be of European descent and the sons of British parents.

Successful candidates are enlisted for a period of five years, on the completion of which they may apply for a further period or periods of service up to the age limit for their class, which is 38 years. Provision is made for promotions to commissioned rank to complete establishment.

Training is carried out on light type civil aircraft at selected civil flying schools. Pilots of Section I are required to train every year for approximately three weeks. Pilots of Section II are required to carry out initial training for approximately nine weeks during the first six months of service, for approximately one week in the second six months, and for approximately three weeks a year thereafter. The initial training of pilots in Section II commences with a fortnight's ground course, after which they complete a total of 50 hours' (dual and solo) flying training. The actual length of the course, as of all the flying courses, is dependent on the time taken to complete the prescribed amount of training.

Pilots receive pay and allowances (or issues in kind) ranging from 16s. 6d. to 17s. 6d. a day when carrying out training. In addition, they receive reserve pay at 9d. a day and flying reserve pay at £10 a year, subject to compliance with the regulations.

Candidates can obtain further details, which are contained in A.M. Pamphlet 56, on application to the Secretary, Air Ministry, Kingsway, W.C.2.

ATTACHMENT OF FOREIGN OFFICERS.—Lieutenants Li-Shou Chen and S. K. Lee, of the Chinese Air Service, having completed the eleven months' course at No. 3 Flying Training School, have been respectively attached to No. 16 (Army Co-operation) Squadron, Old Sarum, and to No. 9 (Bomber) Squadron, Boscombe Down.

Captain Ljungdahl, Swedish Air Force, having completed his attachment to the School of Army Co-operation on 24th November, 1934, was further attached to No. 10 (B) Squadron, Boscombe Down, R.A.F., Abingdon, and No. 23 (F) Squadron, Biggin Hill.

RE-EQUIPMENT OF UNITS.

The following re-equipment of R.A.F. Units has recently taken place :—

Unit.		*Details.*		
No.	10 Squadron	Heyford	replaced	Virginia.
„	84 „	Vincent	„	Wapiti.
„	605 „	Hart	„	Wapiti.
„	811 „	Baffin	„	Ripon.
„	823 „	Seal	„	IIIF. F.A.A.
„	824 „	Seal	„	IIIF. F.A.A.

The following units are expected to complete or commence re-equipment during the next few months :—

No.	7 Squadron	Heyford	replacing	Virginia.
„	8 „	*Vincent	„	IIIF. G.P.
„	19 „	Gauntlet	„	Bulldog IIA.
„	24 „	Hart	„	Osprey.
„	30 „	*Hardy	„	Wapiti.
„	36 „	Vildebeest	„	Horsley T.B.
„	202 „	Scapa	„	IIIF. F.A.A.
„	205 „	†Singapore	„	Southampton.
„	604 „	*3 Hart	„	Wapiti.
„	820 „	Shark	„	Seal.
„	1 Coast Defence Training Flight	Osprey	„	IIIF. F.A.A.

* Re-equipment of these units has already commenced.

† These aircraft, which are being flown out to Singapore, left Pembroke Dock on 15th January, 1935, as reported elsewhere.

NOMENCLATURE.

The official name of the Blackburn T.S.R. aeroplane with Tiger engine is "Shark."

The official name of the Fairey Aviation Co., Ltd., night bomber aeroplane with two Kestrel engines is "Hendon."

ARMY CO-OPERATION

The normal divisional and brigade training was carried out during 1934 by all five army co-operation squadrons and, in addition, detachments attended the R.A. practice camps for co-operation during live firing.

The following exercises of special interest were held during the year :—

(1) A War Office corps exercise without troops was held in May, in which the Commanding Officers and the I.L. Sections of Nos. 2, 4, and 13 (A.C.) Squadrons took part, acting in their usual capacity. No flying took place, except for a small amount of photography.

(2) The Staff College, Camberley, held their signal exercise in July, which involved the co-operation of Nos. 4 and 13 (A.C.) Squadrons, and full flying was carried out during this exercise.

(3) A Combined Operations exercise was held in Yorkshire in September, and No. 26 (A.C.) Squadron and one flight of No. 4 (A.C.) Squadron were employed on the side of the landing force, whilst one flight of No. 4 (A.C.) Squadron assisted the defence.

In addition Nos. 35 and 207 (Bomber) Squadrons and No. 54 (Fighter) Squadron, as well as units of the Fleet Air Arm, took part in this exercise.

(4) A Southern Command exercise was held in the Salisbury Plain area in September, and Nos. 13 and 16 (A.C.) Squadrons, each reinforced by a flight from No. 4 (A.C.) Squadron, took part.

In addition to the A.C. Squadrons, Nos. 18 and 57 (Bomber) Squadrons and Nos. 29 and 54 (Fighter) Squadrons were also employed in this exercise.

In all the above exercises, army co-operation pilots carried out their normal duties of reconnaissance and photography.

A flight of No. 26 (A.C.) Squadron visited Scotland and successfully carried out a large amount of co-operation with formations and units in the Scottish Command. A very useful handbook, illustrated by air photographs, of possible landing grounds in Scotland has been compiled as a result of this detachment.

During the past year, the formation of the 1st Tank Brigade lent additional interest to the season's training. No. 4 (A.C.) Squadron provided a special flight at Tilshead for two months for co-operation with the brigade, and many problems of inter-communication, reconnaissance, etc., were studied.

The co-operation of fighter aircraft in carrying out low flying attacks against army formations, in order that the latter may practice small arms anti-aircraft defence, has been on a greater scale this year than previously, and this use of fighter squadrons has become a regular feature of army co-operation training.

Fighter squadrons have also been affiliated to army co-operation units for practising attack and defence tactics, and No. 41 (Fighter) Squadron in particular carried out a most successful programme with Nos. 13 and 16 (A.C.) Squadrons during a reconnaissance exercise when the 1st Division were marching from Aldershot to Salisbury Plain.

At the end of July a Vickers "Valentia" bomber transport aircraft was attached to Farnborough for ten days in order that units of the 1st and 2nd Divisions might

practice emplaning, deplaning, and loading of aircraft, and obtain flying experience in a troop carrier. Rifle and machine-gun platoons carried out these practices, and each party was given a short flight. One party was taken up for a three hours' flight in order to test the fitness of the troops for immediate operations after a long flight.

During the year, No. 16 (A.C.) Squadron was equipped with Audax aircraft, and now all army co-operation squadrons are equipped with this type. The Audax has continued to prove very satisfactory for army co-operation work, and its speed is an important factor in the problem of security when the aircraft are working singly.

During August, six Rota aircraft were delivered to Old Sarum, where preliminary instruction is to be given on this type preparatory to their being used for trial on army co-operation duties. These aircraft arrived too late to commence these trials during the collective training season, and their use was confined to flying training, with the exception that the Chief of the Imperial General Staff and a Staff Officer were flown from Warminster to Porthcawl and back, and one Rota was made available for the umpire staff during the Southern Command exercise in September.

OVERSEAS COMMANDS

ADEN.

VISIT OF THE KING OF ITALY TO ADEN.—On 29th October, H.M. the King of Italy arrived at Aden in the Royal Yacht "Savoia," accompanied by the Italian cruiser "Gorizia." He was received with a salute of guns and a fly-over by five aircraft of No. 8 (Bomber) Squadron on entering the harbour. The King landed on the following morning and after a stay of a few hours, during which he inspected a guard of honour composed of Army and Air Force personnel and the Aden Protectorate Levies, he re-embarked. The salute and fly-over were repeated on his departure.

ADEN–WEST AFRICA FLIGHT.—Four Fairey IIIF. aircraft of No. 8 (B) Squadron under the command of Squadron Leader H. B. Russell, A.F.C., left Aden on the 9th January, 1935, on a service training flight to West Africa, and return. Proceeding via Port Sudan (10th), Khartum (11th), El Fashar (12th), Fort Lamy (13th), Bauchi (14th), Katsina (16th), Sokoto (17th), Niamey (19th), Ougadougou (20th) and Bamako (21st), the aircraft were due to reach Freetown, where the outward flight terminates, on 22nd January. The return flight was scheduled to commence on 27th January, and, following the same route as on the outward flight, the aircraft were due to arrive back at Aden on 10th February.

Owing to an outbreak of yellow fever in Nigeria and Gambia it was found necessary to curtail the original programme of continuing the flight to Bathurst, thus reducing the round flight to one of approximately 11,000 miles.

INDIA.

CHITRAL RELIEF, 1934.—On the occasion of the biennial relief of Chitral, which took place between 15th September and 13th October, 1934, attacks by a small lashkar raised by the Fakir of Alingar were made against the Nawab of Dir's forces, which were protecting the relief column on its return journey through the Nawab's territory.

A request for air action was made by the Political Agent, Malakand, to assist the Nawab in dispersing the attackers, and in consequence air attacks were made on the 11th October against hostile tribesmen on the hills West of the Panjkora, when they were skirmishing with the Nawab's forces, and again on the 12th October,

when the column passed. On the latter date the lashkar was also engaged by the artillery with the column. The tribesmen were driven out of their positions, several casualties being inflicted.

IRAQ.

VISIT OF A.O.C. TO TEHERAN.—Air Vice-Marshal C. S. Burnett, C.B., C.B.E., D.S.O., Air Officer Commanding, British Forces in Iraq, who had flown to Teheran with two Wapitis of the Communication Flight on the 22nd August, 1934, was received by the Shah on the 23rd. The A.O.C. made a short stay at Isfahan during his visit to Persia, and returned to Iraq on the 3rd September. The aircraft were fitted with long-distance tanks, and flew direct from Isfahan to Hinaidi, a distance of 425 miles.

VISIT OF H.R.H. THE CROWN PRINCE OF SWEDEN TO IRAQ.—On 1st November their Royal Highnesses the Crown Prince and Crown Princess of Sweden, accompanied by Prince Bertil and Princess Ingrid, who were on a visit to Iraq, were conveyed in a Victoria aircraft of No. 70 (B.T.) Squadron from Aleppo to Ramadi, where they were accorded an official welcome by the Iraq Government. The journey to Baghdad was continued by road. On the 28th November the Crown Prince and members of his suite were conveyed to Warka, where he paid a visit to the ruins. The party was subsequently conveyed to Ur, whence they returned to Baghdad by rail.

SOMALILAND.

EXERCISE WITH THE CAMEL CORPS.—An exercise was carried out by a flight of No. 8 (Bomber) Squadron in July, in co-operation with the Somaliland Camel Corps, with the object of :—

(*a*) Discovering the extent to which the Kharif (an intermittent but severe dust storm that blows from May to September) could interfere with air operations.

(*b*) To give the personnel of the flight and the Camel Corps experience of co-operation, especially in intercommunication by means of W/T and the T. panel.

Long flights were undertaken from Burao to every point of the compass without difficulty, and the conclusion reached was that, although the Kharif might cause local and temporary dislocation of air operations, it would never interfere with them seriously for long.

The co-operation carried out with the Camel Corps was satisfactory.

INTER-COMMAND FLIGHTS.

CRUISE OF No. 203 (F.B.) SQUADRON.—The three Rangoon flying boats of No. 203 (F.B.) Squadron, which had taken part in the State of Victoria Centenary Celebrations, left Melbourne on the return flight to Basra on 11th November, 1934. Although unexpectedly delayed at Singapore for eight days in order to carry out certain modifications to one of the boats, the Squadron duly reached Basra on the 21st December, only one day behind the original schedule. The return flight, which followed the route taken on the outward journey, detailed in last Quarter's Notes, included an overland crossing of the mainland of India from Chittagong to Karachi, a distance of about 1,550 miles, and completed a round trip of approximately 19,000 miles.

KOHAT TO SINGAPORE AND RETURN BY No. 60 (BOMBER) SQUADRON.—Four Wapitis of No. 60 (Bomber) Squadron left Kohat on 29th November, 1934, on a flight to Singapore and return. On 4th December the pilot and airman of one of the aircraft, overcome by fumes caused by a burst petrol pipe, escaped by parachute,

landing uninjured; the aircraft crashed 6 miles S.E. of Alor Star. The remaining aircraft continued the flight to Singapore, which they reached on 5th December.

The return flight was commenced on the 11th December, 1934, Kohat being reached on 21st December. The itinerary of the flight was as follows:—Kohat–Cawnpore–Dacca–Rangoon–Mergui–Alor Star–Seletar; and return by same route.

RISALPUR–SINGAPORE FLIGHT BY NO. 11 (B) SQUADRON.—Twelve Hawker "Hart" aircraft of No. 11 (B) Squadron left Risalpur on 2nd January, 1935, on an inter-command training exercise to Singapore. Proceeding via Delhi–Gaya–Akyab–Rangoon–Mergui and Alor Star, the squadron reached Singapore on the 8th January. One machine was delayed at Dacca, but otherwise the flight was carried out according to schedule and without incident.

The return flight, following the same route taken on the outward flight, commenced on 15th January, the squadron being due to arrive at Risalpur on the 24th January. The round flight will be one of more than 7,000 miles.

DOMINION OF CANADA

During June and July a R.A.F. flight of five Fury aircraft from No. 1 (F) Squadron toured the provinces of Ontario and Quebec in Canada. The flight was transported by sea from England to Canada, and the aircraft were landed at St. Hubert, the Airport of Ontario.

After a formal visit to Ottawa the flight proceeded to Toronto, which was celebrating its centenary. In co-operation with the Canadian Siskin Flight and several civil aircraft, an air display was given twice a day for the three days of the celebrations. The display was staged over Lake Ontario in front of the Exhibition Buildings, and was witnessed by enormous crowds, the attendance on the last evening being probably greater than that at a Hendon Display.

Subsequently visits were paid to most of the important towns in the two provinces, including London, Kitchener, Hamilton, Ottawa, Montreal and Quebec, and demonstrations were given over many of the smaller towns. Visits were also paid to the Royal Canadian Air Force at Borden, Trenton and at Ottawa, where the Fury Flight took part in the first Canadian "Hendon."

FOREIGN

FRANCE

DECENTRALIZATION OF ARMAMENTS INDUSTRY.—A decree was published on 4th October, 1934, which states that, in future, no new contractor will be added to the permanent lists of the Ministries for War, Marine, and Air, whose factory is situated within the boundaries of the Paris region. The decree does not apply. however, to a contractor supplying material which has been put out to open tender,

ORGANIZATION OF THE AIR FORCE IN THE LEVANT.—In pursuance of the law of 30th June, 1933, legalizing the independent status of the Air Force, an important decree was published on the 4th October, 1934, which grants a considerable measure of autonomy to the Air Force in the Levant. By this decree the command of the Air Force in the Levant is placed under an Air Force officer and is made entirely separate from the Army Command, although on special occasions during operations it may be subordinated to the latter on the orders of the High Commissioner.

GREECE

A special loan of a sum equivalent to £324,075 is to be raised in Greece for the purchase of new aircraft, increase of Air Force personnel, and for new aerodromes.

Information has been received that the Greek Air Ministry have ordered 12 Armstrong Siddeley " Lynx " engines, which are to be installed in Avro aircraft now being built at Blackburn's factory in Greece.

ITALY

SUPPLEMENTARY AIR VOTE FOR CURRENT YEAR.—In July, 1934, the Italian Government authorized a supplementary air vote of £13,043,478 at par for the " renewal of aeronautical material." No definite period for the expenditure of this supplementary vote was specified at the time. It is now officially stated in Rome that from this credit £1,379,310 has been appropriated for the financial year 1934–35.

PASSIVE DEFENCE MEASURES.—The great importance attached to " Passive Defence " by the Italian Government is further demonstrated by a recent decree giving judicial status to a body known as " The National Union for Anti-Aircraft Protection." Its main purposes are propaganda, the organization of volunteer squads to assist the existing Passive Defence authorities, and the collection of funds.

The Italian Government has had four gramophone records made giving instructions for the protection of the public against aero-chemical attacks. These records have been put on sale at a low price.

AIR STAFF COLLEGE.—The newly built Air Force Staff College has now been officially opened. According to the Press, the first two courses began on 1st November: one for Lieutenant-Colonels and one, a two-year course, for Captains.

INCREASED PAY FOR AIR FORCE.—The pay of the officers and men of the Regia Aeronautica is being increased by 10 per cent.

FIGHTER SQUADRON RE-EQUIPMENT.—The re-equipment of the fighter units of the Regia Aeronautica, with their new single-seater fighter, the C.R.30, appears to be proceeding apace. A Press report refers to a recent formation flight of thirty of these C.R.30s from near Venice to Rome. Incidentally this formation flight is said to have averaged 204 m.p.h.; wind conditions not stated.

FORMATION OF AN AIR COMMAND IN LIBYA.—As a corollary to the unification of the colony, a recent decree sanctions the establishment of an Air Command in Libya. The A.O.C., who is answerable direct to the Governor of Libya, is given the equivalent rank to Air Commodore, and under him are two formations, corresponding approximately to our wings, in Tripolitania and Cyrenaica respectively. All the Air Forces in the colony will be directly under the orders of the A.O.C., except such squadrons as are specially detached for Army duties.

HIGH ALTITUDE FLYING IN THE REGIA AERONAUTICA.—A High Altitude Section has been established in the Italian Air Force for the purpose of investigating conditions in the stratosphere. This section, which is permanently stationed at the Italian " R.A.E.," consists of about twenty pilots who are undergoing methodical training in order to suit themselves for long flights at altitudes above 30,000 feet. Much interesting data has been obtained already. As far as is known, the flying kit adopted consists of thick fur clothes, an oxygen container fixed to the back of the pilot, and a special helmet lined with lead. Radiotelephony is used on all practice flights.

SUPPLY OF AIRCRAFT TO CHINA.—The German Press announces the formation in Italy of a commercial syndicate with a capital of 600,000 lire (£6,520) to exploit the manufacture and sale of Italian aircraft in China. In addition, the erection of

aircraft and engine factories in that country is contemplated. The firms of Caproni, Savoia, Fiat, and Breda each have representatives on the Board.

NON-STOP SEAPLANE RECORD.—A Press report states that on 19th October an Italian seaplane flew non-stop from Monfalcone (near Trieste) to Massawa, in Eritrea, thereby setting up a world's record for a long-distance flight by a seaplane. The distance is 2,576 miles and the flight took 26½ hours. The aircraft concerned is a single-engined Italian built seaplane designed by the firm of Cant. It is designed for military purposes, has two gun positions, a top speed of 161 m.p.h. and, without overload, has a range of 1,553 miles. The return flight to Italy took the form of a propaganda tour, the aircraft being exhibited at Istanbul, Odessa, Constantsa, Varna, Athens, and Durazzo.

WORLD'S SPEED RECORD.—The Press reports that Agello, of the Regia Aeronautica—the present holder of the world's speed record—has beaten his own record by flying at an (officially timed) average speed of 440.67 m.p.h. over a measured course. His previous record, made in April last, was 423.7 m.p.h. The aircraft and engine used was the same as on his previous record, namely, the Macchi M.C.72 seaplane and the Fiat A.S.6 tandem engine, though the latter had been modified and improved.

JAPAN

NEW AIR STATION.—It is understood that the Naval Air Service intend to establish a station near Kagoshina, and a tract of land has been purchased in this vicinity.

PORTUGAL

NAVAL AIR SERVICE.—About 50 per cent. of the aircraft of the Naval Air Service are now definitely to be scrapped, and the Minister of Marine has allotted a sum of approximately £54,000 for the modernization of her equipment. The Portuguese Naval Air Service at present consists of about 17 aircraft (inclusive of training).

PAN-AMERICAN-AIRWAYS' ACTIVITY IN THE AZORES.—A Press report states that Pan-American-Airways are shortly to establish a seaplane base at the Horta Island, in the Azores.

AERODROMES IN THE CAPE VERDE ISLANDS.—It is learnt from a Press source that Air France has established aerodromes at Porto Praia and Maio, in the Cape Verde Islands, presumably in connection with their air line to South America.

A PORTUGUESE-FRENCH AIR CONVENTION.—A new Air Navigation Convention has been concluded between the French and Portuguese Governments giving reciprocal rights for flights over each other's territory in certain of their East and West African colonies.

SPAIN

REORGANIZATION OF AIR SERVICES.—The centralization of military, naval, and civil aviation under a single control is reported to be complete. An Air Ministry has been established and a Central Directorate of Aviation under the direct control of the Cabinet has been created.

SWEDEN

AIR DEFENCE.—The Swedish Government have issued a circular relating to the air defence of Sweden.

The coastguard service is responsible for air defence warnings, in co-operation with the warning stations which telephone reports to the air defence warning centre.

The air defence artillery is equipped with heavy guns, machine guns, and searchlights. Air defence is to be organized in such a way that, even if necessary guns and machine guns are not at present available, the organization can be brought into action without change immediately the necessary material is available.

Air protection includes measures for extinction of and masking of lights, shelters for civilians, first aid, detection of gas, disinfection, instructions to civilians in the event of an air raid, etc., all of which are to be carried out by certain of the civil authorities under the instructions of the military authorities. A quantity of material will be needed to meet the requirements outlined, and a special grant will have to be obtained during the autumn to meet the cost.

UNITED STATES

Single or Multi-Engined Aircraft.—At a conference in August last between the Director of Air Commerce and representatives of the air transport companies it was announced that new regulations have been framed for the control of civil air routes. The following are extracts from the official report of the conference :—

" Much thought has been given to the use of single and multi-motored aircraft. The conclusion reached was that at this stage of development single-engined craft have a definite role for daytime operations in scheduled air transportation, and should not be unnecessarily restricted in carrying out that role, but that where terrain or other conditions make it necessary to have the added safety factor possessed by a multi-engined craft capable of continuing flight with one engine dead, such a craft should be definitely required by the airline regulations. Accordingly, the regulations contain authority for use of single-engined aircraft for day flights over all airways, provided such airways have suitable landing terrain. At night, multi-motored craft are required for passenger operations. Single-engined craft will not be permitted to operate over or through clouds or fog. Multi-engined craft may do so on radio-equipped routes, and provided they are prepared to take advantage of the radio aids to air navigation."

Army Aircraft—New High-Speed Requirements.—The U.S. War Department has invited tenders for various types of aircraft to be ordered in 1935. Performance requirements for the various classes are stated to be :—

S.S. Fighters.—Maximum speed of 300 m.p.h.

Two-Seater Fighters.—Maximum speed, 300 m.p.h. ; operating speed, 270 m.p.h. ; service ceiling, 30,000 feet.

Corps Observation.—Maximum speed of 250 m.p.h.

Attack Aircraft.—Maximum speed, 250 m.p.h. ; operating speed, 220 m.p.h.

Twin-engine Bomber.—Maximum speed of 250 m.p.h. ; operating speed, 220 m.p.h.

New Army Airship.—A new non-rigid airship has been constructed for the Army Air Corps. The envelope has a length of 245 feet and a maximum diameter of 60 feet, its cubic capacity being 400,000 cu. ft. The car has accommodation for a crew of ten and is 43 feet in length, with a maximum width of 10 feet. An observer's car, to be lowered from the airship on a cable, is also provided. There are three engines : two of 300 h.p., each mounted forward and one on either side of the control car, and a third of 125 h.p. mounted at the stern. The new airship will be used for training and experimental purposes.

REVIEWS OF BOOKS

GENERAL

Hitler Rearms : An Exposure of Germany's War Plans. Edited by Dorothy Woodman. (John Lane). 10s. 6d.

The editress of this work is an enthusiast for her cause, and she has taken endless trouble to secure first-hand materials to compile an indictment of Nazi Germany's warlike proclivities of to-day. Yet somehow, in spite of the great merits of the work, it is impossible to sympathize wholly with the spirit in which it was undertaken, or with certain interpretations placed upon facts which are in themselves incontrovertible. Such an opinion is strengthened when it is realized that, at the moment this book was going through the press, the events of 30th June, 1934, had already robbed the Brownshirt Troops of much of their militaristic significance. The decadence of the Brownshirts was to be followed by the crash of the far more formidable Blackshirts, Herr Himmler's secret police, gunmen—executioners if you will.

A more sober and less sensational rendering of the facts would carry more conviction. Germany is rearming; that much is an undisputed fact. Mr. Baldwin's statement in Parliament on 28th November last could not have put the case more clearly. But between these proved data and much of Miss Woodman's indictment there is a gap, and a very wide gap it is.[1] The German is nothing if not a keen judge of troops and of armaments; he is not likely to rush into a war on the strength of possessing even such armaments and troops as are depicted in this book. It is a pity that the editress could not have been more careful of the meaning she sets on face values. Equally so, she might be more chary of implying, as she clearly does, that the British Government are virtually conniving at this German rearmament by allowing the export of war material. That may be good propaganda; but it is dubious history.

When Miss Woodman comes to writing about the military and nationalistic hysteria from which Nazi Germany is suffering she is on far surer ground, and much that she states is not only true, but full of grave possibilities for the future. We can there agree with her wholeheartedly. It is the German war mentality, far more than the growth of Germany's armaments, that is to be feared. Anyhow we can hope for five years in which Germany can modify her chauvinism, for no serious soldier in Germany could desire to initiate a war until her present armaments are more fully organized and elaborated.

NAVAL

The Submarine Peril. By Admiral of the Fleet Earl Jellicoe. (Cassell & Co.). 8s. 6d.

Lord Jellicoe became First Sea Lord in December, 1916, when he created the Anti-Submarine Division of the Naval Staff. In his new book he brings into relief vital facts which governed naval policy during 1917. It is well that they should be known, if only to discredit mischievous or misleading statements which recently have attained publicity.

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[1] See "The International Situation" in this number, p. 168.

Various schemes proposed for the occupation or destruction of the enemy submarine bases are outlined, the reasons for turning them down in 1917 being given. It becomes clearer than ever how, throughout the whole anti-submarine campaign, we were handicapped by the fact that, on the outbreak of war, there was no known method of detecting underwater craft, and no practical weapon but the gun for use against them. The belated invention of the depth-charge provided another weapon, but by 1917 there were barely enough to supply the host of vessels which required them. Statistics prove the remarkably low percentage of *successful* attacks on submarines. As Lord Jellicoe truly remarks, the difficulty of destroying them is not realized even now.

The Anti-Submarine Division included senior officers of varied war experience, younger officers possessing special aptitude for the novel technical requirements involved, also eminent scientists and technical civilians eager to apply their minds to the problem of underwater detection and other urgent research work. Energy was immediately directed to the development of offensive methods of every kind, and to hastening the provision of craft and material for use against submarines. Similar energy was applied to the provision of mines and of defensive appliances for merchant ships, and to increasing the minesweeping service and air patrols.

These measures, involving design, production, and training, took time to mature. Meanwhile unrestricted submarine war opened in February, 1917. Eventually a general convoy system saved the situation, but in reviewing subsequent increase in enemy losses Lord Jellicoe justly points out that convoy alone could not possibly have defeated the submarine.

The First Sea Lord was clearly as conversant with the possibilities of convoy as anyone. The vital question, which he alone could decide, was *when* it could be applied. By April, 1917, he shows that several factors had changed which, taken together, made a system of general convoy a practicable proposition. Not the least of these was the entry of the United States into the War. This freed the Tenth Cruiser Squadron from the northern patrol, thus providing additional ocean escort ships. United States ports became available for assembling convoys, and, thanks to the hearty co-operation of their navy, their destroyers were quickly available for our waters. Accordingly the Admiralty immediately ordered a trial convoy from Gibraltar. A scheme for a general system was worked out, and in June was put into operation.

After reading this book it will be apparent that, although general convoy was only adopted just in time to save the situation, there were very real, if not insuperable, difficulties to it being introduced at an earlier date. Full details of the organization give some idea of the complexity of the undertaking, and provide a most useful record.

The Riddle of Jutland. By Langhorne Gibson and Vice-Admiral J. E. T. Harper. C.B., M.V.O. (Cassell & Co., Ltd.). 18s.

To naval officers who have studied Jutland in all its intricacies and in the light of their professional training, this, the latest and most comprehensive work on the subject, will reveal little that is new regarding the actual battle; but the authors are to be warmly congratulated on having written a book which places that historic encounter in its true perspective relative to the whole drama of the Great War, and in having at last presented the complete story in language which the great mass of the reading public can understand and take a delight in following from beginning to end.

There will be critics who will complain that in places naval history has degenerated into journalese; but of what use is history if for the majority it only promotes mental indigestion? Jutland, of all the great episodes of the War, has been for too long incomprehensible to the people of this country—much less to foreigners—because it has been described in the dry language of official records or surrounded by technical controversies which the "man in the street" could never hope to understand. The result has been that he has formed vague and general impressions from a Press—for the most part equally bewildered though not deterred thereby from being dogmatic in its ignorance.

There will be many who will deplore, as the Navy has always deplored, the introduction of personalities and of comparisons of individual achievements; but it should be remembered that such invidious distinctions arose in the first place from the efforts of those who, through ignorance or malice, endeavoured for years to show that failure to secure a more spectacular success at Jutland had been due to defects in the British high command. The quiet dignity with which so much unwarrantable criticism has been ignored is now widely recognized and applauded in the Service; but that is not enough. It is due to Admiral Jellicoe that more of what the country and our late allies owe him should be made known as widely as possible during his lifetime, and in this respect the "Riddle of Jutland" is only performing a belated duty for the present generation. If in the process of fighting the battle o'er again other commanders are brought under the searchlight of the authors' criticism, that light is now projected on a screen where the details have been filled in properly, and from which lessons for the future can be thrown into clear relief. Uninformed abuse is unpardonable, and the history of Jutland as an object lesson for the future has suffered in its numerous misrepresentations from far too much ignorant partisanship. Now, however, the essential facts are all known, and are here set forth—probably in greater detail than has ever been done in the case of any other sea engagement. If in the process it is shown that certain mistakes were made, personal loyalties should not make us blind to them or resent their being pointed out. We can only learn from mistakes—our own and others.

Sea Power in the Modern World. By Admiral Sir Herbert Richmond, K.C.B. (G. Bell & Sons, Ltd.). 10s. 6d.

Since the time when Mahan began writing his classic works the world's naval estimates have risen enormously, with every prospect of still further increase. On the other hand, doubts are expressed to-day as to the use of navies under modern conditions. The principles of sea power evolved through Mahan's weighty analysis—often, be it said, wrongly applied—remain unchanged; but new policies and new methods of warfare seem to many to have confused the issue. On the eve of another Naval Conference, Admiral Richmond considers a fresh investigation of the subject to be well worth while.

He begins with a brief historical survey of the causes of sea power amongst the nations. He shows that, in its strongest form, it rests on three elements—merchant shipping, colonies or overseas possessions, and a fighting force which functions in accordance with recognized rules of the sea. In the last of these elements he includes aircraft of any kind employed over the sea.

The composition of the navies of the world, past and present, are discussed in detail with the object of determining in what, if any, respects they may have exceeded the true needs of sea power, either in numbers or in power of their individual units. Admiral Richmond again advances his well-known arguments

against the large battleship. But the weight of naval opinion is against his contention that, because vessels of 10,000 tons served their purpose in the past, they could, if the Sea Powers would agree, be made adequate for the duties of a capital ship to-day. For technical reasons, it is impossible to design a ship with the essential features of a battleship on 10,000 tons or anything approaching that displacement; certain essentials would have to be surrendered, as has been done in the case of the German " Deutschlands."

Whether peace and security is to rest in future on some form of collective action, or to be left to the armed forces of individual nations, the author considers a matter for statesmen. But under any system, he maintains, sea power can usefully play its part, and in a special chapter he covers this new ground. The merits of " Economic Boycott " and the threat of drastic bombing by an " International Air Force " are fully discussed. Of the two he prefers the former.

Any attempt to summarize the many conclusions reached, without giving his carefully weighed arguments in support, would be unfair to the author. One proposal deals with the method of assessing the needs for battleship strength amongst the nations. Briefly, the idea is that, instead of a scale *down* from an arbitrary maximum; as applied at Washington, there should be a reasoned scale *up* from a minimum: a convenient minimum, it is suggested, to work from would be the German strength stablished by the Versailles Treaty, modified as necessary.

Another interesting idea is that the prevailing need for costly destroyers, created by the advent of the submarine, might be partly met by building cheaper craft under 2,000 tons and armed with guns only, craft whose number is not restricted by existing Naval Treaties.

Brassey's Naval and Shipping Annual, 1935. Edited by Commander C. N. Robinson, R.N., and H. M. Ross. (William Clowes & Sons, Ltd.). 25s.

The editors of Brassey have " rounded out " the scope of this year's Annual so that it now embraces a comprehensive review of sea affairs—super-surface, surface, and sub-surface: there is no more complete publication of its kind in the world.

The first three chapters, on " The Naval Forces of the British Empire," " Foreign Navies," and " Relative Naval Strength," all go to show, once again, what a parlous condition our Navy has been brought to as the result of sloppy idealism, international gestures (to which no other nation has responded), and political intrigues. Our capital ships are out of date, and are rapidly being outclassed by those of lesser Sea Powers; our cruisers are far too few; moreover, because we have tied our hands in the matter of tonnage, we are even now building ships which are inferior to their foreign contemporaries; and our flotilla leaders are hopelessly outclassed by those of France and Italy, with which they share the waters of the Mediterranean.

The Air Section of the Annual, with its excellent chapters on British and foreign Fleet Air Arms, makes no less depressing reading. " It is an unfortunate fact," says the author of the British chapter, " that during the last ten years . . . British naval air strength has fallen to a very low point. By comparison with foreign naval Powers, it is overwhelmingly outnumbered, and the unfavourable ratio is growing every year." . . . " The Fleet Air Arm . . . is . . . barely half its proper strength."

Anyone who has studied the present naval situation cannot help feeling acute

anxiety, coupled with sincere sympathy for the present Board of Admiralty, who have been left such a bleak inheritance and who are faced with such a grave responsibility. But, if we are ever to arouse the country to a sense of its real danger, it must be by fully stating the facts and not continually concealing our weakness; and this Brassey does in clear and unmistakable language for those who will read it. The chapter on "Disarmament and Naval Polity" shows the futility of our lead in a reduction of armaments and the need to return to "the old and well-tried road of sane diplomacy . . . and a sufficient fleet behind it."

While the numerous tables, profiles and plans both of warships and merchant vessels are still an indispensible feature of the Annual, it has become far more than a work of reference; it is, in fact, a yearly stocktaking of the whole of our sea resources *vis-à-vis* those of other nations, and as such it should be studied most carefully, not only by every naval officer, but by every intelligent British man and woman.

Jane's Fighting Ships, 1934. Edited by Oscar Parkes, O.B.E., M.B., Ch.B. (Sampson Low, Marston & Co., Ltd., London). £2 2 0.

It is with very great regret that we learn from this year's "Fighting Ships" that Dr. Oscar Parkes is resigning his editorship. The mantle of Fred T. Jane—the founder of this great annual, could not have fallen on worthier shoulders, and the navies of all the world owe a lasting debt to his successor, who for sixteen years has been mainly responsible, not merely for carrying on this good work, but for improving each successive edition.

We can well understand that the publishers will be hard put to it to find anyone to replace Dr. Parkes; but it is unthinkable that "Fighting Ships" should not maintain the same high standard in the future that it has under his editorship, for it is, indeed, indispensable.

Another former editor, Mr. Maurice Prendergast, who stepped into the breach and kept the annual going on the death of its founder, contributes an article to this quarter's JOURNAL,[1] in which constant reference is made to the information contained in this year's "Fighting Ships" regarding the navies of the principal Sea Powers; these sections require no further comment.

It is important to notice that Germany is pushing on with her new fleet, and has laid down a fifth "Deutschland." In four years' time she may have six of these ships, and unless we take drastic action at the earliest possible moment, we shall be in a position of hopeless inferiority to her in the number of ships we will possess capable of dealing with this new fast battle fleet.

Another, much smaller, type of "pocket battleship"—really a modern monitor—is the Finnish "Ilmarinen" class, recent photographs of which are given. These vessels look businesslike with their four 10-inch high-elevation guns, and would doubtless prove valuable for the sort of work our "Erebus" and "Terror" did in the War.

In general, the same meticulous care is given to the ships of the lesser navies as to those of the Greater Powers, which is another characteristic which makes "Jane's Fighting Ships" the invaluable publication it has become under Dr. Parkes' editorship.

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[1] "Warship Construction Under the Naval Treaties": see p. 93.

British Merchant Ships. By Paymaster-Lieutenant E. C. Talbot-Booth, R.N.R. (Rich & Cowan, Ltd.). £1 1s.

This volume is for the Merchant Navy what the British section of "Jane's Fighting Ships" is to the Royal Navy.

It opens with four pages of coloured plates of house flags and funnels. Then follow seven most attractive pages in colour of some of the best-known ships of to-day. The bulk of the book is taken up with line drawings, to a scale of 150 feet to the inch, of a very large proportion of the deep-sea vessels of British, Dominion and overseas companies. The remainder is devoted to an alphabetical list of the principal companies, with details of their ships. There is also an index of ships' names.

The author is to be congratulated on having compiled a volume which should be in the chart-house of every sea-going British ship, and the publishers on their enterprise in producing it.

MILITARY

Military Operations: France and Belgium, 1918. (The German March Offensive and its Preliminaries). Compiled by Brigadier-General Sir James E. Edmonds, C.B., C.M.G. Maps by Major A. F. Becke. (Macmillan & Co.). Price: Text, 12s. 6d.; Appendices, 6s. 6d.; Maps, 5s.

For a variety of reasons, chiefly because, owing to the loss of the Fifth Army records in the retreat of 1918, it had become necessary to collect evidence from the survivors of that Army, it was decided some years ago to push on with the compilation of the story of 1918, before the narrative of 1917 had been completed, and even before that of 1917 had taken definite shape. So the reader of the Official History will find a gap of 18 months in the relation of the War as a whole. That, however, is not a serious drawback, since the German offensive of March, 1918, ushers in such a distinct epoch of the War, and can be traced so definitely to the results of the Russian Revolution of 1917, that it may be regarded as almost a self-contained act of the great drama.

The first seven chapters of the new volume deal with the events preceding the German offensive. The effects of the Russian Revolution began to be felt before the close of 1917; by January, 1918, it was clear that 160 German divisions were present on the Western Front, a number likely to be increased to 185 by the end of February. This accretion of strength was diagnosed as being directed against the northern part of the Allied line. Nevertheless the French authorities, supported by the British Government, were pressing Sir Douglas Haig to take over a new sector of the front and so disperse his strength. In spite of many protests it was finally arranged that this should be done, and the British front was extended to the R. Oise, where Sir Herbert Gough's Fifth Army, with only 10 divisions and 3 cavalry divisions, was allotted to a front of 42 miles. To complicate matters the British Government declined to send reinforcements overseas in sufficient numbers to counterbalance the weakness. Finally, the defences of the front, which had not been attacked previously, were found to be weak.

The task of the Fifth Army when the German blow fell on 21st March was thankless. Overwhelmed by sheer weight of numbers, the Fifth Army could but retreat. It seemed for a time as though the III and XVIII Corps, on the right, might hold the line of the R. Somme, but, as has so often happened in war, the defence of a river line is not easy in practice. These two corps suffered very severely;

fortunately the XIX Corps, to the left of these, was enabled to offer a remarkable resistance, so that the weakening and lengthening line of the Fifth Army managed to hold together. The retreat of the VII Corps on its left was jeopardized by the fact that the Third Army, on its left again, which had been attacked with equal determination by the Germans, clung too long to the Flesquières Salient—the only gain of the Battle of Cambrai—and to Monchy-le-Preux. The Third Army, having a better and stronger front to hold, fared better in the battle than did the Fifth Army, in spite of the very grave risks that were run by the delay in giving up ground so as to conform to the retreat of the Fifth Army.

The story of the retreat is narrated from 21st to 26th March, the latter day being marked by the historic conference at Doullens, at which General Foch was appointed generalissimo of the Allied forces. It makes good reading and is a fine piece of work. The narrative has been pieced together from statements made by some 1,500 survivors of the battle: these have been supplemented and completed by copious references to German sources of information, particularly to German regimental histories, which constitute one of the best sources of information for the whole War. One chapter is devoted to the doings of the Third and Fifth Armies respectively for each day of the retreat: large-scale maps further render the movements intelligible.

Two main factors emerge from the story. In the first place it is abundantly clear that the entire crisis of the Fifth Army retreat was rendered more perilous by the lack of understanding between the British and French; then, when the blow fell, because of the manner in which French reinforcements arrived to strengthen the weakening Fifth Army. Indeed, the Germans had counted on their hesitation (see p. 145). Moreover, these reinforcements arrived piecemeal with no artillery, except for one division. Even when they arrived they should have been placed under the orders of General Gough, instead of the contrary being done; that is, the British troops were placed under the improvised French headquarters, which had but an imperfect familiarity with local conditions. It seems strange that no plan had been prepared for forming a French mass to strike the German advance in flank from a southerly direction in case of such an attack being launched. Indeed, the whole preoccupation of the French seems to have been for the safety of Paris, and General Pétain is shown to have envisaged the possibility of giving up touch with Sir Douglas Haig. It was very largely to obviate this danger that Sir Douglas was so anxious at the Conference of Doullens to press for the unity of command under General Foch.

In the second place, the narrative demonstrates how helpless was the Fifth Army against the long prepared and powerful German thrust. If the latter failed to achieve its purpose, this fortunate circumstance can be ascribed largely to the stout resistance of the two Armies attacked, as well as to the difficulties which the Germans experienced in bringing up their guns and supplies. This deficiency in artillery support is testified to this day by the state of the buildings and countryside generally between Péronne and the R. Oise. The devastation perpetrated in March, 1917, further to the North during the German retreat to the Hindenburg Line, recoiled on the heads of its authors.

The whole volume is fully up to the high standard of its predecessors.

R. E. Lee. By D. S. Freeman. Vols. I and II. (Scribners). 15s. each volume.

This first instalment of a full-length biography of General Lee will be warmly welcomed. Military reputations rise and fall. Lee's claim to be regarded as the

greatest military figure of the Civil War has been seriously challenged. The present generation of military writers appears to prefer Grant or Sherman. Lee was placed at a disadvantage, because he left no memoirs and had no biographies to do for him what Colonel Henderson did for Jackson. But Mr. Freeman's biography, to be completed in four volumes, should go far towards re-establishing Lee's old fame. For this task no man could be better equipped than Mr. Freeman. His edition (1915) of " Lee's confidential dispatches to Davis " prepared the way. Now, twenty years later, the promise is fulfilled.

Indefatigable in his research, extending over " more than a decade," among sources hitherto unexplored, he has thrown a flood of light upon Lee's earlier career—his seventeen years' service in the U.S. Army before the Mexican War. It is the record of the somewhat " drab " routine work of an officer of the Engineer Corps. But the two and a half years spent in improving the navigation of the upper Mississippi and the Missouri established Lee's reputation as a practical engineer and formed a vital factor in determining his future. " The opportunities that were to come to him in Mexico were created at St. Louis."

These opportunities Lee turned to good account. At the campaign's close he was accounted by General Scott ' the coming man ' and his own destined successor. Mr. Freeman justly claims Lee as a pupil of the Scott school of war, enumerating the seven great lessons, learned in Mexico, which " were the basis of virtually all he attempted to do in Virginia fifteen years later." Of these perhaps the greatest was audacity: that audacity which inspires " the leader of a desperate cause " to take the risks unavoidable in a struggle against great odds, as at Second Manassas and Chancellorsville.

The credit for initiating the great flank marches in those two campaigns is shown to belong to Lee, though he left Jackson a free hand in their execution. Similarly, Jackson's " Valley Campaign " is shown in its truer proportions. The conception was Lee's, whose primary concern was for Fredericksburg, to prevent McDowell's corps from co-operating with the main army before Richmond. Lee planned the campaign; Jackson's sole original contribution was the movement against Fremont. It was only when Lee recognized the Federal Government's reaction to Jackson's blow at Winchester that he detected the weak spot in their defences—an excessive nervousness for the safety of Washington. Whiting and Lawton were sent to the Valley, not as a ruse to deceive the enemy, but to enable Jackson to complete the work begun at Cross Keys and Port Republic. He would have still further reinforced Jackson for an invasion of Pennsylvania could he have persuaded Davis to withdraw the necessary troops from the Atlantic coast. Lee saw that the invasion of Pennsylvania would " change the character of the war."

Mr. Freeman finds strong arguments to support his theory, that Lee's object in moving Jackson round Pope's flank in August, 1862, was to force Pope to retreat by manœuvring, and thus recover territory on which he could subsist his own army, until reinforcements reached him; then he intended to invade Pennsylvania and threaten its great commercial cities. Battle was forced upon him; still he persevered with his design and would have carried it into effect had not an unlucky chance revealed to McClellan the division of the Confederate forces.

The second volume closes with Chancellorsville and the death of Jackson, an irreparable loss. But already economic attrition was becoming a greater danger than the Army of the Potomac. The winter of 1862–63 had sounded " the first warnings of coming ruin " and the difficulty of feeding his men and horses was crippling Lee's strategy.

In his treatment of military operations the author has adopted a method both original and effective. He places the reader at Confederate G.H.Q., where he receives the intelligence reports only as they arrive. He is given no further information (except in footnotes, where necessary) than " Lee possessed at a particular moment regarding the strength, movements and plans of his adversary." Thus is reproduced that " fog of war," the existence of which is regarded by Mr. Freeman as " one of the prime realities in military history."

The Infantry Experiment. By Major-General H. Rowan-Robinson, C.B., C.M.G., D.S.O. (William Clowes & Sons, Ltd.). 3s.

General Rowan-Robinson is very clearly one of those who desire to see the reformation of the methods of war. There are several categories of such critics, starting with those whose gospel may be epitomized as " The air and nothing but the air," for whom the only weapon is the gun and the bomb of the aeroplane, and for whom ground troops are simply aerodrome guards. After these we have the tank enthusiasts in whose minds the air arm and even the artillery are mere accessories. Less advanced than these is the school which still retains foot soldiers in its scheme of things; but nowadays we have to come very low down in the human scale to find anyone ready to launch unarmoured infantry against modern weapons and against modern obstacles.

In " The Infantry Experiment " General Rowan-Robinson shows himself to stand about midway between the extreme left and the extreme right wings of the schools of thought. He still retains foot soldiers for first-class fighting, but recognizes that they must be dependent upon what tanks can achieve for them.

Again, he envisages the continuance on the one hand of infantry for imperial policing or gendarmerie work, and on the other of a navy for the defence of our food supply, which is still to comprise a proportion of large ships. But he declines to concede a complete supremacy in what in the past used to be called " desert warfare " to Air Forces. In these respects some may consider him reactionary, but, on the other hand, one is constrained to admire his advocacy of such advanced ideas as complete air supply of troops in mountain warfare, of a highly developed mechanized force, and of the ultra-bullet. Briefly, in his scheme of things, to use his own words, " Infantry will indeed drop from the leading place into that of an auxiliary, but in addition to that it will be given a definite and lively role."

There are many things with which the futurist school will quarrel in this work, such as its neglect of the pros and cons of heavy armour for tanks, of the need for intense fire support for these machines, of the logical developments of hydrogenation of coal, and on the other hand of the under-estimation of defensive gun power and of the value of quick-setting concrete in prepared positions.

No thinking soldier, whether he considers it too advanced or not advanced enough, should neglect this book, which will give him much matter for consideration.

Memoirs of Sir Lowry Cole. Edited by Maud Lowry Cole and Stephen Gwynn. (Macmillan & Co.). 12s. 6d.

Sir Lowry Cole is well known as the distinguished commander of Wellington's 4th Division in the Peninsula. These Memoirs consist mainly of letters to and from him, with some explanatory paragraphs.

It is amazing to read that at the early age of 26 he was not only a Lieutenant-Colonel in the Army, but also a M.P. for County Fermanagh; and that he had already fought and been wounded at the battle of Vinegar Hill in Ireland.

His real military career may be said to have begun in Egypt under Abercromby, where he was serving in 1801 as Lieut.-Colonel in a corps of Albanians raised by General Villette. In 1806 he was commanding the 27th Inniskilling Fusiliers, and with them went through the still almost unknown Maida campaign. It was not until 1809 that he went to join Wellington in Portugal, where he soon made his mark, not only by his military qualities, but also for the excellence of his table. The Memoirs contain some interesting matter concerning the Lines of Torres Vedras, and then about the battle of Albuera. Cole, so it appears, did not think very much of Marshal Beresford as a commander after the conclusion of the battle. But, as Wellington himself remarked, "such another battle would ruin us." Beresford achieved wonders in organizing the Portuguese; he did not shine as a commander in action. Cole, of course, was by this time in command of the 4th Division and had soon proved himself a most competent leader in action. At Salamanca, in 1812, Cole once more distinguished himself. In March, 1813, he was deservedly created K.C.B.

All through the battles of the Pyrenees the 4th Division was active, though not altogether engaged as heavily as its commander seems to have desired. The Peace of Paris followed, and Cole went to Paris. It is this portion of the Memoirs which provides the most interesting matter. Lady Malmesbury's diary, which is quoted, gives some astonishing sidelights on the attitude of the Parisians towards the Allied occupation of the city.

Cole did not command his 4th Division again at Waterloo. Sir Thomas Picton, who had taken his place, was killed on the field. But soon after the battle Sir Lowry Cole was once more in France. Again, these Memoirs are thoroughly interesting concerning current events in France after the defeat of Napoleon when, in 1816, Cole took command of the army of occupation at Cambrai. It was an interesting time for Cole. Soon after quitting Cambrai he lost his patron, Lord Malmesbury, and he feared that he would be forgotten. That, however, was not the case, for in 1823 he became Governor of Mauritius. There he remained until 1828, when he was transferred to be Governor of Cape Colony, returning home in 1833. His letters written at that time are well worth reading.

This very pleasant book is not, strictly speaking, a biography; neither does it aspire to be a military record of a fine soldier. But it is full of valuable letters which need to be pieced together to form a continuous story; for that purpose a genealogical table showing Sir Lowry's various relations, as well as a summary, with dates, of his career, would have assisted the reader. But this need not detract from the interest or value of the compilation.

Faraway Campaign. By F. James. (Grayson & Grayson). 8s. 6d.

It has been said that when the Almighty created the world he threw all the debris into Baluchistan and Eastern Persia, a corner of Asia sometimes called the "Rubbish heap of the world." The author of "Faraway Campaign," with the ready pen of the writer, transports us to this comfortless, barren, and dry land where, more often than not, only brackish water exists. He invites us to accompany him on the Faraway Campaign which took place in these "salubrious" surroundings, a theatre known in the Great War as the Eastern Persian Cordon. We, who have also sojourned in this faraway land, appreciate his faithful description of the desolate scenery, the colour, the general atmosphere, and the strange fascination and charm of this desert land, with its utter lack of life, movement or trace of civilization. The author is, or has been, a genuine Regimental officer of the old

" Risala," or Indian Cavalry, who loved his men and horses. He brings out little personal human touches which illustrate the spirit and comradeship which exists between British officers and their Indian ranks. He varies his description of a somewhat monotonous life with incidents amusing and otherwise. We appreciate his sympathy and feelings of old-time chivalry with those German, Austrian and other enemy " parties hostile to our interests," gallant men who did their best and lost. He depicts most realistically scraps in which he and his men took part, such as the " Ambush in the Tangi." He describes to us the Baluch tribesmen, abominably cruel and treacherous to a degree, also the Cossacks of the Don, with their love of music and dancing. He eulogizes briefly but with no little enthusiasm General Dyer, of Seistan and Amritsar fame.

" Faraway Campaign " is good reading, interesting and vastly intriguing; we are never bored.

During the Great War, and until rather late in the day, when Lord Curzon, at that time Foreign Secretary, lifted a veil and told Parliament something of what had been going on in that " neutral " country, campaigns taking place in Eastern, Southern and Northern Persia were treated very much as " hush, hush " operations, for obvious reasons. " Faraway Campaign " will be in consequence a more than welcome addition to our Library.

In the Wake of the Tank: The first eighteen years of mechanization in the British Army. By Lieut.-Colonel G. Le Q. Martel, D.S.O., M.C., R.E. (Sifton Praed). 15s.

This book originally appeared in 1931, and was reviewed in the JOURNAL at the time. The present, second, edition has been brought up to date and corrected. The first fifteen chapters were found to need only revision and occasional correction. But the final five chapters may be regarded as entirely new. Thus Chapter XVIII clearly sums up the situation with regard to the necessity of the introduction of a machine to support attacking infantry, although it does not forecast the policy, just adopted by the War Office, of creating special tank units for work with infantry.[1] It is a useful popular work on the whole subject of mechanization.

Our Bit. Memories of War Service. By a Canadian Nursing Sister, M. B. Clint, A.R.R.C. (The Royal Victoria Hospital, Montreal). $1.25.

This record of a Canadian Nursing Sister's experiences is full of reminiscences that will appeal to those who had the misfortune to be wounded in the War, but the good fortune to fall into the hands of such able nursing sisters as the writer undoubtedly was. Her little sidelights on life in military hospitals in France, in the Eastern Mediterranean and in Egypt all ring true and form good reading. But Miss Clint is perhaps a little severe on the British reading public when she states that she meets people " who have read only German books about the War." Still the bitter memories of bombed hospitals and sunken hospital ships may well cause such depth of feeling to be overlooked.

The Problems and Responsibilities of the Territorial Army. By Lieut.-Colonel J. K. Dunlop, M.C., T.D. (Hugh Rees). 2s. 6d.

The author of this little book has written more than one article on the Territorial Army, while he submitted an excellent essay for the Gold Medal of the R.U.S.I.

[1] See Lecture, " The Trend of Organization of the Army," in this number of the JOURNAL, p. 1, and also article on " The Functions of Tanks " p. 104.

in 1933, to which the referees awarded the Second Trench-Gascoigne Prize. These various productions are now reproduced in one condensed and continuous whole. In view of the recent conference as to a possible reorganization of the Territorial Army, its appearance is welcome, for it is the product of clear, reasoned thought.

The first chapter, which is perhaps the most important, reviews the whole question as to the true place of the Territorial Army in the scheme of Imperial Defence. The subject is treated historically, and from his arguments the author deduces that the Territorials should be organized so as to fill five functions, these being: (1) Home Defence; (2) provision of a certain number of divisions for overseas; (3) raising a national army; (4) supply of reinforcements to the Regular Army; (5) maintenance of a military tradition. Each of these functions is then examined, and the remainder of the book states the author's views as to how the Territorial Army can best solve these various demands which may be made of it. It is a well reasoned piece of constructive work.

The Map-Reading "Instructor." By Major A. C. Wilson, Army Educational Corps. 2nd Edition. (Sifton Praed). 5s. 6d.

This is a second, much revised and enlarged, edition of a useful book. The former edition has proved its worth, both for the instruction of beginners and for the study of examination candidates. The new edition follows the same methods as the old, that is, it advocates and expounds a sound training in map-reading indoors, with suitable maps and schemes, to be followed by appropriate exercises out of doors. We note that conventional signs used by the Royal Air Force are given; we would have liked to see a chapter on air photography in relation to maps and to the use of maps. This should be supplied in any further edition.

Service Athletics. By Major the Hon. W. S. P. Alexander, D.S.O., Irish Guards, and Major I. E. F. Campbell, D.C.L.I. (Technical Press, Ltd.). 4s.

This manual is intended for use not only in the Services, but also at colleges and Public Schools. It contains a wealth of information concerning such sports as Cross-Country Running, Sprinting and Middle Distances, Mile, Relay Racing, Hurdling, High Jumping, Long Jumping and Shot Putting. There is a mine of information in this book, which is obviously the fruit of a long study of athletic meetings; it should be of use to umpires, trainers and competitors alike. There is an initial section dealing with the psychology of training, which is perhaps the most valuable section of the book.

REGIMENTAL HISTORIES

British Regiments. By Sir John Fortescue. (*The Times*). 1s.

During the War Sir John Fortescue wrote a brief historical sketch of the Coldstream Guards for *The Times*. This was followed, by request, by a series of similar sketches, dealing some with a single regiment, others with a group of kindred units. Now, twenty years after these had appeared in *The Times*, it has been decided to reprint them in pamphlet form. As will be seen, these very brief sketches are in reality a series of succinct regimental histories, which have gained greatly from skilled compression and that dramatic touch which was Sir John Fortescue's greatest merit. As they stand, these little histories are also a vivid call to arms to the nation at large to join the Army in France; they gain greatly in fire from having been written in that vein.

The History of the 48th (South Midland) Divisional Signals, Territorial Army. Compiled by Captain E. A. James. (Journal Printers, Birmingham). For private circulation.

The history of a signal unit of the Territorial Army since the Great War. Part I deals with the origin of the unit; Part II devotes one chapter to each year of the unit's activity since 1919

The History of the 2/6th Battalion The Royal Warwickshire Regiment, 1914–1919. (Cornish Bros., Birmingham). Price 3s. 6d.

This volume narrates the story of a second-line Territorial unit from its raising in October, 1914, down to November, 1919, when it was disbanded. The battalion belonged to the 61st Division, and proceeded to France as part of that formation in 1915. In the winter of 1917–18 the unit was amalgamated with the 2/5th Warwickshire Regiment. A very simple and brief story of how a battalion went through the Great War.

The Long Ride. A short history of the 17th Duke of York's Royal Canadian Hussars. By Major Harwood Steele, M.C. (Published by 17th D.Y.R.C. Hussars, Montreal). 25 cents.

This unit, a non-permanent Militia unit of the Canadian forces, has had a distinguished and interesting career since 1812. It served in the war of 1812, the rebellion of 1837, the Fenian Raids of 1866–70, the South African War and the Great War. There is much entirely new matter in this little book concerning the history of the Canadian Militia. It should prove of value to the student of British military history as well as to those connected with the regiment.

AIR

Jane's All the World's Aircraft. Edited by C. G. Grey. Compiled by Leonard Bridgman. (Sampson Low.) £2 2s.

This is the twenty-fourth year of issue of "Jane's All the World's Aircraft," and with the rapid development of aviation it becomes more and more a necessary addition to any reference library. But it is far more than just a work of reference. The expert and layman alike will find much of absorbing interest in the complete record that it offers of all modern aircraft, airships, and aero-engines, for aeronautical progress is daily more closely affecting the average man and woman, and is awakening in them a corresponding degree of interest. Recent events, such as the amazing flights to Australia in the McRobertson Trophy Race, and the announcement in Parliament of the new schedule for air postal service to all parts of the Empire, have strengthened this interest in aviation, and there will be many people, apart from those seeking technical information, who will want to avail themselves of the information that is so clearly set out in this now standard work.

The labour involved in editing and compiling this volume will be appreciated when it is realized that aviation in every part of the world is fully described and illustrated. The book is divided into five main parts, the first two comprising a historical section, with descriptions of the flying services, both civil and military, of every nation; the remainder are devoted to the aeroplanes, aero-engines and airships of the world. These are all finely illustrated by photographs and scale drawings, with complete specifications of all current types.

The Service reader especially will turn with interest to the descriptions of foreign air forces. An important addition to this section during the last two years is the space devoted to the organization of the Soviet air force. This space has been

amplified from a few paragraphs to a detailed description of this very large and growing service which, as the reader may see by turning to the aircraft section, is " working systematically to become independent of the outside world." There is, of course, no record of a German air force, but there is a full description of German civil aviation, including the Deutscher Luftsport-Verband e.V., which controls the training of pilots for what is discreetly termed " non-commercial purposes."

In the Preface by the editor the developments of 1934 are discussed, and attention is drawn to the increasing use of " streamline " for both aircraft and motor-cars.

Aircraft of the British Empire. Compiled and edited by Leonard Bridgman. (Sampson Low). 7s. 6d.

This handy little volume contains all the relevant information concerning the aircraft in use within the British Empire. The aircraft are all illustrated, and described in detail. This book will be invaluable to all those endeavouring to interest people in empire products and in the number and variety of aircraft produced by British manufacturers.

D.A.T. (Defense Aerienne du Territoire). By General Niessel, General Chabord and G. de Guilhermy. (Editions Cosmopolite).

The time is long past when the civil population could expect to be exempt from the dangers that, hitherto, have mostly been suffered by the fighting forces and those in the zone of war. Modern bombing aircraft have made the whole area within their range the zone of war. A declaration of war may in future be heralded by the bursting of a large high explosive bomb in one of our main streets. When that happens the nation will not want to know the result of the last " conversation " on disarmament; it will demand to be told what the Government has done to provide bombproof shelters, gas masks, and fire-fighting appliances, and what " the man in the street " himself should do in such an emergency.

How and why we should be prepared for such eventualities is clearly demonstrated by this illuminating book. Its authors are, of course, dealing only with the air defence of France, but the principles involved are every bit as applicable to this country. Even more so, as recent newspaper reports indicate that, since the publication of this book, the French Government has taken action in building shelters, etc., while we are, quite literally, still defenceless against sustained massed air attack. The authors take particular care that the horrors and dangers attending aerial invasion are neither over, nor under, estimated. They show that, *with well organized preparation*, a great deal can be done to mitigate the distress caused by such attack; but they have nothing but abhorrence for those " enemies of their country " who, under the pretext of creating a war scare, refuse to explain to the public the probable dangers to be encountered on the outbreak of any future war, and, worse still, take no steps to provide adequate shelter and equipment for use in that emergency. They also dismiss the suggestion that such preparation would have an adverse effect on foreign opinion. How can anyone, they ask, hold that to make arrangements to diminish as far as possible the horrors attending war for the civil population be interpreted as an aggressive act?

Decidedly, this is a book for all with the safety of their country at heart to read. Sooner or later, our Government will be bound to take action, whether on similar lines or not, to provide bombproof shelters, and to create those organizations essential to a national air defence scheme. Every European Power has done or is doing so, but in England party politics delay action and bring ever nearer the danger of our being caught unprepared once again.

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31st December, 1934.

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Current, Deposit and other Accounts, including Reserve for Income Tax and Contingencies and Balance of Profit and Loss	368,850,884	
Balances in Account with Subsidiary Banks	11,242,875	
		380,093,759
Acceptances and Endorsements, &c., for account of Customers		7,205,554
Paid-up Capital		15,858,217
Reserve Fund		10,250,000

ASSETS	
Cash in hand, and with the Bank of England	46,809,954
Balances with other British Banks and Cheques in course of collection	11,889,908
Money at Call and Short Notice	25,837,900
Bills Discounted	47,572,778
Investments	103,242,464
Investments in Subsidiary Banks (at cost, *less* amounts written off): The British Linen Bank—£1,238,744 Stock	3,716,232
Union Bank of Manchester Limited—300,000 Shares of £5 each, £2 10s. paid	750,000
Other Subsidiary Banks—(including fully paid Shares and 500,000 "B" Shares of £5 each, £1 per Share paid up, in Barclays Bank (Dominion, Colonial and Overseas) and 1,000,000 Shares of £1 each, 5s. per share paid up, in Barclays Bank (France) Limited)	2,755,143
Advances to Customers and other Accounts	155,979,234
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